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THE ROLE OF NOVEL SEMANTIC INTENTIONS AND ENCODING PROCESSES IN SECOND LANGUAGE DEVELOPMENT

by

© DANIEL P. FEARON

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For Arlene, Murray, Valerie, and Maureen

Abstract

The purpose of this study is to define and to investigate two task variables involved in the development of an L2, namely, novel (vis à vis the learner's L1) semantic intentions and novel encoding processes.

In order to assess the role of these two variables in early L2 development, an experiment was conducted using nine monolingual subjects, aged 9 to 15 1/2 years, in which a miniature artificial language was taught and learned during a one-week period. This language contained three examples of each of the two experimental categories and learner success was evaluated for each of these six variables.

The results indicate that the category difference plays a role in predicting learner behaviour. Each category showed different learning patterns in the experiment and a hierarchy of difficulty based on psycholinguistic and sociolinguistic grounds was established for the variables in each category.

The study concludes with a discussion of the pedagogical implications of these results.

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I. STATEMENT OF THE PROBLEM AND HYPOTHESIS

A. Preliminary

In order to discuss meaningfully the way in which a second language (L2) is developed by a learner, it is necessary to define the task confronting the learner and to investigate and estimate the difficulty of the various aspects of this task. However, defining learning as a task is not easy, because to do so requires a theoretical view of language that considers it as a psychophysical process. To answer questions about how an L2 is developed, we require information about the psychological and physical states and processes that constitute language in the individual.

Various attempts have been made to define the L2 development task. These attempts have not been completely successful because of inadequate theoretical bases for the construction of a model. In general, the approach used by theorists to construct a formal L2 learning model has been to combine theoretical linguistic analyses with current learning theory in an attempt to explain how a learner has managed to master the intracies of a particular system of linguistic constructs. Such models have not addressed the larger and more important question of language behaviour in the individual and the manner in which the task of L2 learning is developed.

Two models have sought to explain how learners develop an L2: Contrastive Analysis (CA), and Error Analysis (EA). The first was popular through the 40s and 50s, the second has attracted considerable attention since the early 70s. The theoretical position of Contrastive Analysis was rooted in behavioral psychology and structural linguistics. Behavioral psychologists considered human behaviour to be the sum of its smallest components. Consequently, language learning was viewed as a process of acquiring all of the discrete components constituting a given language. Once learned in a first language (L1), these various elements could, according to behavioralists, transfer positively into another language, or alternatively cause negative interference if they differed from items found in the L2. The principal psychological force behind L2 development was seen to be the transfer and interference effects of items in an L1 on items in an L2, and the principal problem of learning an L2 was assumed to be how to overcome the differences between discrete items in the two languages.

It was assumed earlier in this century that structural linguistics could "scientifically" describe all of the elements comprising the structure of language. Although structural linguists had succeeded in describing some aspects of the sound and morphemic/syntactic systems in world languages, their taxonomies scarcely penetrated the depths of language complexity.

The assumptions of structuralists and behaviorists merged to produce the Contrastive Analysis model which, until recently, was the orthodox model of L2 learning. Contrastive Analysis theorists produced the "strong" hypothesis (Wardhaugh, 1974) best expressed by Lado (1957), who predicted in reference to the learning of an L2 that "those elements that are similar to his (the language learner's) native language will be simple for him, and those that are different will be difficult" (p.2). At approximately the same time, other CA theorists such as Stockwell, Bowen and Martin (1965) elaborated a complex system in which difficulty in L2 learning was based on a somewhat subjective linguistic analysis of how similar a given structure in the target language was to those of the native language.

Although there has been considerable intuitive appeal for some of the principles proposed in Contrastive Analysis, there has been no empirical support for the strong version, the hypothesis stating that difficulty can be predicted a priori on the basis of a supposed similarity or difference between L1 and L2 structures. Whitman and Jackson (1972) tested the difficulty of English grammar for 2,500 Japanese learners of English using the predictions of four different contrastive analyses. The results supported none of the four models. Brière (1966) tested the strong version of Contrastive Analysis on the learning of new phonological categories of different degrees of similarity to the L1 of

20 speakers of American English and found unexpected and unpredicted (at least by Contrastive Analysis theories) perception problems with pairs of phonemes containing known and new language sounds.

The Error Analysis model differs from the limited view of the strong version of Contrastive Analysis, which explained the L2 development task uniquely in terms of learning in the L2 what was different from items in L1. Error Analysis expanded the view of language development to include intralingual effects such as incorrect overgeneralizations made by L2 learners within the target language, induced errors caused by incorrect teacher explanations, misleading presentations in language textbooks, and various sociolinguistic causes for faulty language production. The production errors made by L2 learners led to an interest in the different communication strategies which learners were hypothesized to use, i.e., language switch, appeals to the authority of the native speaker when all else fails, prefabricated patterns, and topic avoidance as ways of communicating a message, or retreating from a situation where communication has failed.

The theoretical position of Error Analysis is based on the view that the L2 learner is a hypothesis tester involved in a trial-and-error process of creating a new "interlanguage" (Selinker, 1974). This model was inspired by the hypothesis-testing theories of concept learning (Bower & Trabasso, 1964; Restle, 1962), and by Chomskyan linguistics which stresses the creative aspect of new utterance production from a finite number of linguistic rules.

In both the Contrastive Analysis and Error Analysis models, one finds that the language product and its reification are the point of departure for research. A theoretical analysis of language structure or of language errors serves as the basis to discern the psychological processes of the L2 language user. Absent in these two models is any serious consideration of exactly what are the task or tasks that the learner must accomplish in developing an L2. Both CA and EA look at part of the problem involved in L2 development; however, both theories, and in particular CA, make predictions about L2 learning without consideration of the results of the learner's actual behaviour. What is undertaken here is the type of study that CA and EA theorists should ideally do in order to test their theories.

The theoretical base of this study is a view of language which perceives it as consisting of a semantic base of information and a code alphabet made up of linguistic processes and forms through which this information is transmitted. This view of language has its basis in coding theory (Beckmann, 1972), which treats language as a code--a highly complex one, but still subject to the constraints (i.e., memorial, semantic density, time, etc.) of all codes.

A theoretical view such as this has been implicit in much of the study of first language acquisition, in which the emphasis is often equally on the development of semantic intentions and the evolution of linguistic forms used to express them (Clark & Clark, 1977; Bloom, Lifter, & Hafitz, 1980; Slobin, 1973). This view of language has been largely unutilized, however, in the study of second language development, in which the emphasis has been placed almost exclusively on the obvious task of learning the new code alphabet--the new linguistic forms. There are two probable causes of this preponderant interest in form. Firstly, L2 learning studies have been historically based in the arena of learning a second language which is semantically quite similar to the first (i.e. French/English, English/German, French/Russian, etc.) in which no striking differences in the semantic base were evident (although they do exist and may be shown to be a source of some of the persistent pedagogical problems in such language pairs). Secondly, unlike the children studied in acquisition research, the subjects of L2 studies have typically been older children, adolescents, and adults, all of whom already possessed a fully developed L1 semantic base.

It is the premise of this thesis that L2 development subsumes both of these tasks: the acquisition of an almost completely new code alphabet as well as the alteration or extension of the learner's semantic base. It is further the premise of this thesis that the following are the task variables which are involved, and which must be addressed in studying L2 development:

1. comprehension of new semantic intentions;

2. understanding of the operation of new encoding processes;
3. memorization and automatization of new encoding forms.

Points (1) and (2) above are psychological in nature, and (3) is involved with the physical aspect of language development. L2 learners expect (3), and are prepared to deal with it. They do not expect (1), nor do they likely expect (2).

The term semantic intention (cf. Slobin, 1973) was chosen for use in this study over several other contenders from the literature---"grammatical categories" (Hockett, 1958), "grammatical concepts" (Sapir, 1921), "semantic categories" (Bloom, 1970), or "inflectional meaning" (Bee, 1974)---to underline the point that an L2 learner must consciously conceptualize and learn how to encode new "meanings", which do not require explicit marking in his/her own language.

To give a concrete example of what is meant by the different semantic intentions and encoding processes which are found in various languages, consider the following four sentences from German, French, Czech, and English.

1. Das Reisebüro ist wichtig, weil Sie dort Informationen bekommen.
   'The travel office is important because you get information there.'

2. Le chef de bureau regarde les dossiers.
   'The department head looks at the files.'
3. Holka napsala psaní.
   'The girl wrote the letter.'
4. The sheep are white.

In German, French, and Czech (sentences 1 to 3 above), nouns are grouped according to selective categories known as gender. Speakers of these languages are obliged to communicate gender as a semantic intention in virtually every sentence.

In German and Czech, there are three genders (masculine, feminine, and neuter), whereas French and most other members of the Romance Language family have two (masculine and feminine). As well, gender is reflected through a concord system onto articles, adjectives, pronouns, and even onto the verb in Czech past tense. For example, in sentence number 3 above, if a boy rather than a girl had written a letter, the verb would have been expressed as *napsal* rather than *napsala*, the *a* suffix on the Czech verb representing the feminine morpheme. Although the category names of gender suggest that biological sex is the basis for such distinctions, this is not the case. Males and male occupations are usually masculine and females and female occupations are usually feminine in these three languages, but that is where any sex attributes cease to exist. In effect, gender is an arbitrary grouping of nouns, as shown by the fact that a referent such as *letter* is masculine in Czech and German, but feminine in French. Many languages such as English and Hungarian operate quite efficiently without gender, which conveys redundant categorizing information. However, English- and Hungarian-speaking learners of German, French, and Czech must nevertheless learn this semantic intention if they wish to operate effectively in these languages.

A second semantic intention found in all of the examples above is that of number. Number may be restricted to only certain elements in the sentence as in English, where it is found in nouns, verbs, and pronouns. It may also be reflected throughout nearly every sentential element, as in the other three languages. It is interesting to note that all of these languages have words in which there is no difference between singular and plural forms, yet their speakers manage to communicate, even in cases where number is not overtly marked. Whether one says in English that three sheep will appear, or that one sheep will appear, the cardinal number suffices to convey all of the information required to understand number, even in a language which normally marks this semantic intention. A number of world languages such as Japanese and Chinese do not overtly mark number. However, a large number of languages contain this semantic intention and when Japanese- and Chinese-speaking L2 learners address themselves to the learning of English, this is a formal device connected with the concept which must be learned.

A third semantic concept in three of the four examples above is definite vs. indefinite, referring to nouns. Czech and in fact most Slavic languages no longer mark this on nouns. Although English, French, and German speakers may feel, because of their language expectations, that it is important to distinguish between the indefinite or definite use of nouns, speakers of Slavic languages, as well as other world languages, are not obliged by their language to make this distinction. Speakers of Slavic languages who learn English, French, and German must learn a semantic intention which they do not expect to find in language. It is worth noting that there is a large overlap of semantic intentions among world languages, particularly in the domain of vocabulary. The types of unexpected semantic intentions hypothesized in this thesis, those which cause learner problems, are limited to grammatical notions and a few lexical examples.

The four sentences above provide, as well, examples of different arrangements of encoding processes and forms. Different languages use varying arrangements of subject, verb, and objects in sentences, and allow varying degrees of flexibility in the use of a preferred order of these elements. English and French, both relatively uninflected languages as concerns nouns, rely on fixed word order to convey semantic information. This order in declaratives is

SVO.

Russian and to a lesser extent German are freer in their possibilities of varying word order, because of a system of noun case endings which allows a speaker of these languages to use case morphemes in the form of suffixes to signal doer or recipient of an action, instrument used to accomplish an action, etc. For example, in German both *ein Hund beiszt einen Mann* and *einen Mann beiszt ein Hund* mean that a dog bites a man, although there are stylistic differences conveyed by the different word orders. *Ein Hund* can occur either before or after the verb and be understood as subject and agent of the sentence because of a system of case inflection suffixes existing in German.

In declaratives, even though Russian and German are quite highly inflected, speakers of these languages tend to prefer, like French and English, an SVO word order. However, this order is not universally used across all world languages. One finds SOV order in Japanese and VSO in Welsh. The order of S, V, and O is an encoding form which varies across different languages, and must be learned by the L2 learner.

Secondly, German and English allow speakers to combine nouns into noun compounds. In the case of German, a single noun may contain many nouns (a well known example quoted by Mark Twain is *Stadtverordnetenversammlungen* 'city ordinance assemblies'). This encoding technique, called 'composition' by Sapir (1921), is not used in French or to such an extent in Czech. French, for example, employs the structure N + preposition *de* + N to link nouns (*salle de classe* 'classroom').

Thirdly, one finds a system of verb person/number and noun case/number suffixes in all four languages in the examples. Different languages vary in the extent to which they use only suffixing to mark various concepts. As mentioned earlier, one finds both prefixes and suffixes in English. This is also true of the other three languages in the examples. All of these languages come from the same language family, which probably explains a tendency to prefer suffixing or prefixing rather than using a process such as infixing. Other languages such as Shilha make extensive use of infixing as an encoding process.

These examples taken from four languages serve to illustrate some of the different types of semantic intentions and encoding processes which occur in language. Gender, number, and definiteness of nouns are found in many world languages as semantic intentions. However, there are also many languages which make no use of these concepts, but extensive use of others not found in the four languages mentioned above. Encoding processes such as SVO word order, composition, and prefixing or suffixing are used in the languages sampled above. A speaker of a particular language is "biased" in favor of using the semantic intentions and encoding processes learned in an L1, as a result of years of contact with them. He expects an L2 to contain the semantic intentions and encoding processes which he has learned, and will try to make use of them in his learning techniques.

What are the various types of semantic intentions and encoding processes used in language which will impact on the L2 learner? Sapir (1921) identifies six different types of grammatical encoding processes existing in world languages. These are listed below:

1. *WORD ORDER*:

   Word order is fixed in languages such as English and French, and is more flexible in languages using noun case suffixes such as Russian, Czech, and German. As well, major constituents such as subject, verb, and objects can occupy different orderings in a declarative sentence, depending on the language.

2. *COMPOSITION*:

   This is the uniting of two or more radical elements into a single unit such as *typewriter* in English, or *Fernsehteilnehmer* 'television viewer' in German. Languages such as Arabic and French use this process very rarely.

3. *AFFIXING*:

   There are three possible types: suffixing, the most commonly used in world languages, and prefixing and infixing, which are less commonly used.

4. *INTERNAL MODIFICATIONS*:

   This is the process involved in English tense changes such as *sing-sang-sung*, or Arabic *balad* 'place', and plural *bilad* 'places'. Internal modifications can be either vowel modifications, such as those above, or involve a consonant modification like those found in Irish (*bo* 'ox' becomes *bho* or *mo* in different grammatical circumstances).

5. *REDUPLICATION*:

   This is the repetition of part or all of a radical element. Examples of this from three unrelated languages are: Washo: *guso* 'buffalo', *gususu* 'buffaloes'; Hawaiian: *hoe* 'to row', *hoe-hoe* 'to row continuously'; Hotentot: *go* 'to see', *go-go* 'to look at carefully'. Reduplication tends to be used to express concepts such as plurality, and aspectual notions such as increase in size, intensity, repetition, and continuance.

6. *ACCENT*:

   This process can involve either pitch or stress. It is found in tone languages such as Chinese to distinguish meaning, and also occurs in English in noun-verb combinations such as *address*, *transport*, etc.

The semantic intentions expressed in world languages are many and varied. Bee (1974) has taxonomized many of the types of semantic intentions typically expressed in various languages by means of nominals and verbals, and this taxonomy is presented fully below to give the reader a notion of the many new and unexpected semantic intentions which learners may encounter in an L2. Bee refers to these semantic intentions as "inflectional meaning", a term which she uses to contrast with lexical meaning. Her use of this term has similar connotations to what the author is expressing through the use of "semantic intention". It is worth noting that the different concepts below are not necessarily expressed in all languages, and when they are expressed in a particular language, they may be conveyed by elements other than nominals and verbals.

Semantic Categories Typically Expressed by Nominals (after Bee, 1974)

1. *CASE*:

Case is a particularly diffuse semantic category used in different languages to express the relationship between agents and recipients or benefactors in an event, possession, location or movement, etc. Moreover, what appears to be a similar case in two separate languages may in fact express different semantic intentions. Examples of semantic cases are:

(1) Nominative- marks grammatical subject, agent of an action, agent of intransitive verbs in Eskimo, actor and grammatical subject in Hindi;

(2) Accusative- marks direct object, recipient or benefactor or an action;

(3) Vocative- used to address someone;

(4) Instrumental- describes the means by which an action is accomplished (She opened the door with the key);

(5) Locative- indicates the location of something (in, on, etc.);

(6) Directional- indicates movement towards or from. Finnish has numerous of these cases, most of which are equatable with prepositions, as are those of (5) above.

2. *GENDER*:

Bee defines gender as a principle of noun classification. Natural languages classify referents according to many parameters such as:

(1) Masculine vs. Feminine, or Masculine, Feminine, Neuter- these exist in many Indo-European languages, but are not based on any real sex distinctions;

(2) Animate vs. Inanimate- in effect, living vs. nonliving, and found especially in the Amerindian languages;

(3) Human vs. Nonhuman;

(4) Shape and size- large vs. small, round, rectangular, etc. Such distinctions are found in Chinese languages.

(5) Substance- materials from which things are made (wool, stone, etc.);

(6) Tangible vs. Intangible;

(7) Taboo vs. Nontaboo;

(8) Common vs. Place names- these categories are found in Tagalog and Fijian.

3. *PERSON*:

Most languages reference the person involved in an action according to three categories: first person (speaker), second person (hearer, addressee), and third person (referent, nonspeaker, nonhearer). Certain languages, however, make further person distinctions. For example:

(1) Fourth person- this usually refers to the newest arrival in a conversation, the furthest referent from the speaker, or the least relevant object or person under discussion in Amerindian languages. These are usually referenced by the third person in most other languages;

(2) Focus within a person- used to designate one "you" from among many;

(3) Exclusiveness- designates one person to the exclusion of all others, "I alone", "you alone", etc.;

(4) Inclusive vs. Exclusive- includes or excludes the hearer as belonging or excluded from "we";

(5) Honorifics- many languages reflect the social status of speaker and hearer and subject of discourse. Japanese and Korean distinguish several types of social relationships which can exist between differently placed speakers and hearers (equal, superior, inferior, etc.).

4. *NUMBER*:

Different world languages vary from no special overt marking of this concept except by means of a cardinal number to relatively sophisticated distinctions of singular and different gradations of plural number:

(1) Singular vs. Nonsingular as in English;

(2) Singular specified vs. Plural nonspecified (one cow, ten cow, cows) as in Hungarian, Arabic, Georgian;

(3) Singular, dual, trial, paucal (a few), multiple (many), plural as in Fijian and Hawaiian;

(4) Individual vs. Group;

(5) Countable vs. Noncountable.

Semantic Categories Typically Expressed by Verbals

1. *VOICE*:

Bee describes voice as the relationship of the participants to an action. She identifies the following types of voice, some of which are often considered as syntactic rather than semantic categories:

(1) Transitive- one patient, benefactor, etc. expressed;

(2) Intransitive- no patient, benefactor, etc. expressed;

(3) Reflexive- the agent and benefactor are the same person;

(4) Reciprocal- mutual action involving two agents;

(5) Di-transitive- similar to (1) above;

(6) Active;

(7) Passive;

(8) Stative- a passive in languages such as Usarufa where an agent may never be expressed;

(9) Causative;

(10) Benefactive;

(11) Impersonal.

2. *MOOD*:

Bee defines mood as the psychological atmosphere of an action as interpreted by the speaker, and further defines mood according to the degree of expected response on the part of the speaker, the truth value of an utterance, and the attitudinal or emotional set of the speaker:

A. Response Orientation

UNSIGNALED

(1) Indicative- a statement or comment;

(2) Declarative- a statement of fact;

(3) Assertive- an emphatic declaration;

(4) Exclamatory- an emphatic spoken response to some spoken or nonspoken stimulus ("Ouch!", "Hey!").

SPOKEN RESPONSE EXPECTED

(1) Interrogative- a question;

(2) Rhetorical interrogation- a question is posed, but a spoken response is not expected. The answer is intended to be obvious i.e. "What is life all about?".

ACTION RESPONSE EXPECTED

(1) Permissive- someone is given permission to participate is some given activity i.e. "You may go swimming";

(2) Imperative- a command to which a response is

expected i.e. "Close that door!";

(3) Jussive- another form of a command;

(4) Polite vs. Impolite commands;

(5) Petitionary- a petition or request, a form of a polite command i.e. "Will you take me with you?";

(6) Hortatory- an exhortation i.e. "Let us not be too hasty";

(7) Obligative- a command i.e. "You must come on time.";

(8) Prohibitive- a negative command;

(9) Avolitional- a negative recommendation i.e. "You shouldn't do that.".

B. Truth Value Moods

Many languages require information on the source, truthfulness, reliability, or reality of utterances supplied by a speaker:

SOURCE OF INFORMATION

(1) Deductive- used to indicate concrete evidence used as the basis for some utterance;

(2) Inferential- used in some languages to signal abstract evidence or hearsay;

(3) Quotative- a speaker reports someone elses words or opinions.

RELIABILITY

(1) Narrative- relating past events, used for

storytelling;

(2) Suppositional- a statement of opinion, mine or someone elses;

(3) Factual- a statement of known recognized fact.

TRUTH OF DATA

(1) Certative- expresses certainty of an action or statement;

(2) Dubitative- expresses doubt as to whether an action is, has, or will take place;

(3) Negative- an action has not taken place;

(4) Frustrative- a type of negative i.e. the intended action is frustrated: "He listened but did not hear me".

REALITY OF AN EVENT

(1) Conditional - the speaker specifies conditions under which a statement will be true;

(2) Contrary-to-fact conditional- a condition which cannot come to pass i.e. "If I were in his place, I would...";

(3) Consistent-with-fact conditional- a condition which has been fulfulled, consequently, the statement follows logically: "If John had eaten less, he wouldn't be so sick now";

(4) Potential- expresses something which has the potential to occur;

(5) Abilitative- expresses the ability or aptitude of an

actor to perform some action;

(6) Subjunctive- the fulfillment of an action is contingent on something else.

C. Attitudinal Moods, Emotional Attitude

Some moods indicate the emotional and mental attitude of the speaker:

(1) Optative- indicating hope that something will happen;

(2) Desiderative- expressing a desire: "I would like you to...";

(3) Intentive- indicating intention: "I plan to...";

(4) Volitional- a strong intention.

3. *ASPECT*:

The aspect of an action can be considered in different world languages from the point of view of its force, duration, or frequency:

A. Force

(1) Completive vs. incompletive;

(2) Inceptive (inchoative)- insisting on the beginning of a particular action: "He began to leave";

(3) Cessative- insisting on the ending of an action: "He finished making the bed";

(4) Augmentative- action increasing;

(5) Diminutive- action decreasing.

B. Duration

(1) Instantaneous;

(2) Momentaneous- an action covering a short period of time;

(3) Punctiliar- an action viewed as a single point in time, and a single event;

(4) Sequential- one in a series of actions;

(5) Simulfactive- multiple actions viewed as occurring simultaneously;

(6) Continuative- a progressive action: "He is eating".

C. Frequency

(1) Repetitive- repeated action;

(2) Iterative- repeated habitual actions;

(3) Recurrent- a previous action is now recurring: "Once they went to the beach and found some shells and now they have gone again";

(4) Frequentive- frequently repeated actions;

(5) Habituative- habitual action;

(6) Customary- "We used to...".

4. *TENSE*:

Tense is the time orientation of an action independent of its aspect, although tense and aspect are frequently combined in natural languages. Languages often vary in what is considered past or near past.

A. Time Continuum

(1) Past;

(2) Present;

(3) Future.

B. Degrees of Time

(1) Regular;

(2) Near;

(3) Remote

C. Relative Time

(1) Perfect- past action relative to the present;

(2) Pluperfect- prior action relative to the past

(3) Future Perfect- prior action relative to the future.

The formulation of a complete list of even the easily defined semantic intentions expressed in the natural languages of the world represents a major undertaking, and consequently will not be attempted here. The preceding taxonomies of Sapir and Bee have been set out fully in order to define the two task variables.

B. The Task Variable and Learner Expectations

The learning of an L2 can realistically be considered as composed of a number of tasks. An L2 learner must gain facility in a number of basic behaviors if second language development is to proceed to any significant degree of success. For example, a learner of any L2 must be able to accurately produce and comprehend its phones, and the various encoding processes and semantic intentions, appropriateness rules, and the writing system (if there is one) of the L2.

Although many teachers of an L2 know which elements are hardest to learn, very little is known empirically about how different types of task variables interact within one language, much less across different languages. For example, would we expect the learning of a gender system as found in Romance languages to be a harder task than the learning of a number system for an L2 learner whose L1 had neither of these two semantic intentions? Or alternatively, is infixing as an encoding device harder to learn than composition, or is the semantic intention gender harder to learn than either of these two encoding forms? This is the type of question which will be addressed experimentally in the study reported here.

When a learner initially confronts a new L2, he will probably expect the sounds, lexical items ("words"), and exterior mannerisms such as gestures and talking speed to differ from his own L1 and from habits of his community of speakers. However, he may be unlikely to anticipate other differences which go beyond observations based on the sounds of the new L2 and its users. It seems intuitively obvious that the learner will as a first approximation to an L2 expect that the new system, beyond some cosmetic differences, will behave in predictable ways, i.e., like the

L1, in respect to semantic intentions and encoding processes. Most learners would not be able to articulate what these predictable ways might be, since much of the first language process has taken place subconsciously, and learners, linguists, and teachers typically lack both the metalinguistic concepts and terminology that would make this subconscious knowledge accessible.

What does a typical monolingual speaker know about language? The answer is that he knows what he has learned as a practitioner of his L1, and this in the form of intuitive knowledge. He may also have some metalinguistic notions about language that he has learned in school. What this means is that once we learn that our native language expresses certain types of semantic intentions or encoding forms, we will expect our new language obligingly to conceptualize and encode in ways similar to L1. After all, why would the monolingual speaker of English not expect a concept such as number to be encoded in language, since it is marked on all nouns and some verbs in English? The L2 learner does not usually expect to encounter semantic intentions and types of linguistic processes which differ from those in his L1. When this occurs, he must learn each case as a separate task.

The author's experience from the L2 classroom has provided some illuminating examples of errors made by Anglophones learning French. These errors are indicative of learner expectations. Two such examples are listed below:

1. *Jeans auto* used for *L'auto de Jean*, 'John's car';
2. *Je vois elle* used for *Je la vois*, 'I see her'.

The first example shows how the Anglophone's expectation of the encoding form used in English to convey the concept "possession", a case suffix, has been attempted in French. To convey this concept, however, French uses a prepositional structure, literally 'the car of John', instead of a suffix. The first-year student who produced this structure assumed that a known encoding process and form could be successfully used with French lexical items to convey a semantic intention which exists in both English and French.

In the second example, an Anglophone learner encountered the only place in French where SOV word order occurs, namely where there is an object pronoun in a declarative sentence or a question. In cases where the object is a noun, French maintains the same SVO order as occurs in English. Not unexpectedly, the Anglophone L2 learner used the "English" order, which produced a systematic, but erroneous result.

Learner expectations of encoding processes and forms are paralleled by similar expectations of semantic intentions. Languages from outside the Indo-European group provide the most interesting examples of this, since languages within a family usually tend to express similar semantic intentions. Hakuta (1978) observed in a longitudinal study of a five-year old Japanese-speaker, Uguisu, that she mastered English possessives after living only one year in the United States. However, before returning to Japan at the end of a 60-week period, she never did master the notion that plural number must be expressed in English, even though plural and possessive share the same form, and are both attached to nouns in English. Japanese has a possessive particle, but no morpheme for plurality. It seems that Uguisu "expected" (unconsciously, one assumes) that English would not mark a type of semantic intention not overtly marked in Japanese.

A second example of learner problems with unexpected semantic intentions in an L2 is reported in an unpublished master's thesis in which Ballah (1964) investigated the difficulty of the learning of various grammatical concepts and forms in a formal instructional environment. Ballah's subjects were 500 students at the University of Alberta enrolled in a first-year French course. These subjects found the wide variety of semantic intentions combined together in one verb form, the imperfect, to be the most difficult thing in the course to learn. In French, the imperfect "tense" expresses noncompleted aspect, past tense, habitual and repeated actions, and past descriptions. The forms of French imperfect are nearly completely regular, and students predictably had few problems with them, but considerable problems with their correct use. Ballah reported that the learning of the imperfect in French was three times harder than that of French passé composé, which is less predictable in its encoding forms, but a nearly perfect semantic fit for English preterit (Ved) and present perfect (has Ved).

These examples strongly suggest that learner expectations of what an L2 should be will play an important role in its learning. These expectations, established by previous experiences with an L1, interact with the task variables in the learning of the L2 to influence success or lack of success. The task variables of interest in this thesis, as stated previously, are the semantic intentions and encoding processes in an L2 which do not exist in the L1 of a learner.

C. Independence of Semantic Intentions and Encoding Processes in Language

The four examples in the beginning section of this chapter were used to show some of the different types of semantic intentions and encoding processes which can occur in languages that belong to the same language family (in this case, the Indo-European family). Languages outside of the Indo-European group have a greater chance of expressing semantic intentions and using encoding processes which are unfamiliar to the Anglophone learner. Although all four languages in the examples given earlier used suffixing as a formal grammatical process to convey plural number, they could, as a result of historical accident, have used some other encoding devices such as reduplication or tone pitch. Similarly, although these languages all have plural number, it could also have been the case that number be distinguished in some of the different ways mentioned in the Bee taxomony. Each language contains a unique set of semantic intentions and encoding processes and forms; however, there is no one-to-one relationship between semantic concepts and the encoding processes and forms used to convey them.

From the point of view of the L2 learner, a new language may or may not contain the semantic intentions of the L1, and these concepts may or may not be encoded in similar ways to L1. The L2 learner must however learn each new semantic intention as well as the way in which it is encoded. Phrased in a slightly different way, this means that learning problems for a semantic intention may be, and very likely are, different and separate from the learning characteristics of the encoding process and forms transmitting the semantic intention.

If the L2 expresses a new semantic intention, then that intention must be learned in addition to learning how it is encoded. The encoding process and forms may be similar to those of the L1, or quite different. For example, an Anglophone learning Cree will encounter a new system of noun categories. Since English does not normally distinguish nouns on the basis of the animate or inanimate characteristics (although there are pairs such as *sheep-mutton* and *cow-beef* where this occurs), this semantic intention must be acquired independently of the way in which it is encoded. If Cree were to use a system of infixing to mark animacy, then this encoding process would have to be learned with, and in addition to the semantic intention. It could also be the case that Cree marked animacy using encoding devices also used in English. This would simplify the language learning task, although the "unexpected" semantic intention would still have to be learned. The L2 learner who used *Jeans auto* naively assumed that possession in French could be encoded as it is in English, but discovered that semantic intention and encoding devices must be learned separately.

D. Problem and Hypothesis

L2 learning models have attempted to define the L2 development task, but have not succeeded as a result of their theoretical base. It is precisely because recent models have ignored task variables that they have had limited success in explaining L2 development. All L2 learners must develop new and unexpected semantic intentions and new and unexpected encoding processes in order to achieve mastery in a new language. The difficulty of these two task variables is at the present time unresearched, and it is for this reason that they will investigated here.

Evidence from the L2 literature and the author's experiences in the L2 classroom support the claim that L2 learners use their language expectations, established by L1 experiences, when they explore and learn an L2. The strength of such expectations can be judged by examining subjects' learning experiences in a new L2, and the author expects that the evidence from this experiment will give further support to this claim.

In order to test the role of the two task variables in second language development, an experimental study was carried out, which will be reported in the remainder of this paper. Using nine monolingual subjects aged 9 to 15 1/2 years, the experimenter taught a Miniature Artificial Language to his subjects during a one-week period. The MAL contained three examples each of the two task variables of interest, novel encoding processes and novel semantic intentions. With the exception of the lexicon, other language elements were kept as "English" as possible, i.e. as "expected" as possible according to the hypothesis. The structure of the MAL, and how it was taught and the learners' success evaluated, will be discussed in the following chapters.

In summary, the experimenter posed two questions to be addressed in the experiment:

1. As a group, are novel semantic intentions easier to learn than novel encoding processes in an L2, or vice versa?
2. Are certain types of novel encoding processes harder to learn than others, and are certain types of novel semantic intentions harder to learn than others?

The hypotheses advanced are threefold. Firstly, it is hypothesized that unexpected encoding processes and semantic intentions encountered in an L2 by the learner can be shown to play a role in predicting learner success. Secondly, it is hypothesized that novel encoding processes will show different learning patterns than novel semantic intentions. This latter hypothesis is based on the author's suspicion that once clearly comprehended, a new type of semantic intention will be quickly mastered, whereas a new type of encoding form may be comprehended, but will require the development of a slowly acquired reaction. This reaction is not based solely on a cognitive awareness on the part of the learner, but on a sustained contact and use of the L2 over a long period of time. This is equivalent to claiming that an L2 learner needs a "conditioning" period of longer duration than that required to learn new semantic intentions. Thirdly, it is hypothesized that within each of the two task variable categories, novel semantic intentions and novel encoding processes, a hierarchy of difficulty may be established on principled psycholinguistic or sociolinguistic grounds to be discussed later. These hypotheses, and the tests applied to them will be discussed further in the following chapters. The predicted difficulty of learning of variables within the two experimental groups will be found in section B of the next chapter, following a definition and discussion of the task variables.

II. DESCRIPTION OF THE EXPERIMENT

A. Preliminary

The hypotheses as stated in the previous chapter are firstly, that two task variables, unexpected encoding processes and semantic intentions encountered by learners in an L2, will exert an influence on their success in learning the L2. An unexpected process or intention has been defined as one that has not been encountered or used by the learner, who operates through his L1. The second hypothesis is that unexpected encoding processes will show different learning patterns from unexpected semantic intentions. Finally, the third hypothesis postulates that within each of the two task variable categories, novel semantic intentions and novel encoding processes, a hierarchy of difficulty may be established.

These hypotheses were investigated by creating a miniature artificial language in which three exemplars each of the two task variables (yielding six language characteristics) discussed above were taught as part of an L2 to a group of nine subjects during a one-week period. The six language characteristics are hereafter called the variables. A fuller description follows, but in essence, the experiment consisted of two parts: a concept-formation study and the teaching of the MAL. Testing of success on the variables was done during teaching time, and for a period of six months after in order to assess the learning decay rate of each variable across time.

B. Variables Investigated in the Study

Background to the Choice of the Variables

In order to test the effect of the task variables on the learning of an L2, grammars from eight language families were reviewed to find a variety of semantic intentions and encoding processes that exist in real languages, and that differ from those of English. Grammars of the following language groups and languages were searched for possible candidates for this study:

Altaic: Japanese, Korean, Turkish;
Afro-Asiatic: Gulf Arabic, Shilha, Standard Arabic;
Amerindian: Cree, Blackfoot, Menomini, Navajo, Squamish;
Austro-Tai: Hawaiian;
Germanic: German, Old English;
Romance: French;
Slavic: Russian, Ukrainian;
Uralic: Finnish, Hungarian.

From this grammar review, a list of unexpected semantic intentions and encoding processes for the EL1 subjects was prepared and a "short list" of the most interesting ones was compiled for final selection. For illustrating notions of semantic intentions and encoding processes, and for showing the pedagogical concerns involved in constructing the MAL, the following two sections set out the types of variables that were actively considered, and the reasons why each one was finally rejected.

Semantic Intentions

The types of semantic intentions which are of interest in this study are those which must be obligatorily expressed in some language or languages, but not necessarily in others. The Bee taxonomy presented and discussed in the preceding chapter offers many examples of obligatorily marked semantic intentions found in some languages, but not in others.

The reason for marking a particular semantic intention in an L2 may not seem obvious to a learner, consequently, one can claim that such a concept is an arbitrary marking. On the other hand, a particular semantic intention may be connected with the social structure of the speakers of that language, in which event a sociolinguistic explanation can be offered.

1. *The case marking of agent of action, recipient of an action, or instrument of an action.*
   These concepts exist in languages such as Hindi, Japanese, and Korean, and are marked by means of different particles. They are marked in English by word order and preposition, and case marking may seem less arbitrary for the Anglophone because of

the English pronoun case system. The use in this experiment of formalized marking of concepts of agents, benefactors, and instruments of actions proved to be theoretically problematic, and the notion of recipient/benefactor in particular turned out to be a concept which was too diffuse for experimental purposes. Fillmore (1968) has difficulties defining this latter case, which he calls "objective", and defines as semantically "neutral". Moreover, the agent of a sentence is nearly always a grammatical subject in English, and recipient/benefactor is often the direct object or accusative. The subjects of the experiment have all received some formal training in English grammar in the course of their schooling. This created the possibility of a contaminating effect from previous training in grammar concepts in the event this complication had been used in the experiment. It was consequently rejected.

2. *First person inclusive-exclusive plural in verbs.* The addressee may be included or excluded in the term "we" in Cree, Blackfoot, Menomini, and other languages. Anglophone speakers and hearers may be aware of whether the use of the first person plural pronoun includes or excludes the addressee, but do not expect to mark this particular semantic intention. Such information exists in English as

shared background information and rarely requires an explicit linguistic form. Although this concept was appealing as a variable to be investigated, it was rejected because of the difficulty of teaching and testing adequately a concept which in real communication situations would have a low frequency of use.

3. *Use of different levels of discourse depending on the speaker's and hearer's status.*
Languages such as Japanese and Korean include among their semantic concepts an elaborate system of "honorifics", evolving out of the past and present social structures of speakers of these languages. For example, Ramstedt (1968) lists nine different pronouns for "you" in Korean, depending on the social position of the speaker and addressee involved in the speech act, or the level of discourse used by the speaker. Different discourse levels exist in English, and are reflected in subtle ways such as choice of lexical items, length of utterances, tone of voice, etc. The "honorific" concept was considered for inclusion in the experiment, but its dependency on culture distinctions not shared by the subjects mitigated against its use.

4. *The regressive verb tense used to express the notion that something is occurring, but not here and now,*

or related to the speaker and addressee. This tense was interesting, in that it is used in Korean to convey the idea of remoteness in time and space, and serves to contrast with actions located within the range of the speaker's immediate experiences. The regressive tense was rejected because it was felt by the experimenter that since a MAL would be taught as a means of communicating at a fairly elementary level (i.e. at the level of "here and now"), the use of a tense which lacked any connection with the immediate real world of the classroom might prove to be too ambitious a task for the amount of time available for the experiment.

5. *Different partitioning of the concept of number.* A number of languages mark and conceptualize number in ways different from English. Languages such as Russian, Arabic and Hawaiian all have the concept for singular and plural number, but differentiate as well small groups of two, three, a few, etc. This semantic intention, as well as the preceding one, are, from the point of view of the EL1 learner, arbitrarily marked for these concepts since there is no obvious reason why an L2 should mark them. This concept was precluded by the final choice of an unexpected encoding process based on number. The experimenter felt that two task variables based on one element in a sentence, in this case nouns, would

put too much emphasis on one single aspect of language. The next section will explain this problem more fully.

Encoding Processes

1. *Inflectional suffixes.*

   Languages of the Altaic, Germanic, Slavic, and Uralic families mark grammatical relationships such as nominative, genitive, dative, instrumental, and accusative by means of declensional suffixes on nouns. This type of encoding form was not chosen because English makes use of the process of suffixing, and it was also suspected that it would require excessive amounts of learning time.

2. *Place of the adjective relative to nouns.*

   Many natural languages position adjectives after the noun or nouns to which they refer. Greenberg (1963) claims that languages which have subject-object-verb (SOV) word order usually place adjectives after the noun. Since SOV word order was ultimately chosen as one of the encoding forms investigated in this experiment, it seemed reasonable that noun+adjective order be chosen to compliment this choice. However, all of the subjects of the experiment have studied French from one to five years. This would have meant that the subjects would have had previous contact with this order. It was for this reason rejected.

3. *Concord systems.*

Speakers of many Indo-European languages make gender and number agreements between adjectives and articles and the noun to which they refer. As well, there is a gender and number concord system in operation between nouns/pronouns and verbs in certain languages. As with the preceding item, the subjects have already had previous experience with French, a language making use of a concord system. Concord was not used for this reason.

4. *Prefixing.*

This type of encoding process is used in Amerindian languages such as Navajo, in which prefixes are used to inflect verbs. Such a system is appealing in that it contrasts with English, which is predominantly a suffixing language. Prefixing as an encoding process was not chosen since infixing, a related encoding process was ultimately preferred.

5. *Reduplication.*

Languages such as Hawaiian and Korean make use of this type of syntactic process. Hawaiian expresses frequentative actions by reduplicating the root verb. For example, *hoe* means 'to paddle', and *hoe hoe* means 'to paddle continuously'. Korean uses reduplication to express variety. For example, *chip* is 'a house'. However, *chip chip* means 'every house'. Syllable reduplication was not chosen as a separate task variable, rather, the experimenter decided to use vowel reduplication in conjunction with infixing as part of an encoding form discussed in the following section.

In summary, the preceding types of semantic intentions and encoding processes were considered, then rejected for five reasons:

1. They were too difficult to define linguistically as viable semantic intentions;
2. They were semantic intentions that would have a low frequency of use in communication situations (communication situations were stressed in the experiment);
3. They were dependent on cultural institutions unfamiliar to the subjects which could not readily be introduced into the teaching situation;
4. They were manifestly too difficult for the time available for the experiment;
5. They were already "known" through the previous French L2 experiences of the subjects.

Description of the Variables Chosen

Rationale for the Choice

As mentioned earlier, a number of semantic intentions and encoding processes existing in natural languages but not in English were considered as task variables, then rejected for the reasons given. The final choice of which variables were to be tested in the experiment was made on the basis of two criteria.

Firstly, in order to allow the L2 to be used as a tool for communication between speakers and hearers, only variables that would not place an excessive burden on early and relatively unconstrained information exchange were seriously considered. Losses in wider statistical generalizations through choosing randomly from among a large number of variables were balanced against gains coming from the use of variables which did not require unreasonable amounts of preparation before the miniature artificial language (MAL) could be used as a means of communication. Thus, since it was important that the variables be used in an authentic language environment in order to increase intervariable comparability, the experimenter in effect eliminated many variables which might otherwise have been of interest. In short, an "ease of communication" criterion determining which variables were beyond the scope of the experiment was applied by asking the following questions about each candidate:

1. Can this variable be learned in a maximum of three to five hours?
2. Will its inclusion place unreasonable pressures on the communicative use of the MAL or be restricted because of the realm of discourse of the beginning language learner?

The variables which remained were therefore a subset of those found in nineteen languages which seemed teachable and learnable within a relatively short period of time.

Secondly, the application of new encoding processes and semantic intentions on a random basis to different sentential elements would have produced a possible source of variation into the experiment. The second selection criterion used was that variables should apply only to major syntactic consitituents, and in pairs comprising one of each type of semantic intention and encoding process. The three loci of NP, VP, and S were chosen as sites for the experimental investigation. The important point is that pairs of variables were placed in similar locations to improve their comparability.

After the criteria of ease of communication and uniformity of location had been applied, the remaining variables were then adopted for use in the experimental MAL. In all cases a modified form of the variable type found in natural language was developed. These modified semantic intentions or encoding processes sought to come as close as possible to their manifestations in natural language. The principal modification consisted in eliminating exceptions in a variable such as they were found in the natural language from which the variable was taken.

The task variables tested in the experiment are described below. They are listed according to which part of the sentence they apply, and whether they are semantic intentions or encoding processes. Each variable is described in the form that it takes in natural language with its exceptions, and the extent to which the variable is realized, or can be realized, in English. The actual form of each variable will be described in section C (Grammar of the MAL) below.

AT THE LEVEL OF THE NOUN

1. Semantic Intention

Animacy.

Animacy exists as a concept in numerous Amerindian languages, such as Cree (Wohlfart & Carroll, 1981), Blackfoot (Uhlenbeck, 1978), and Menomini (Bloomfield, 1962). For the most part, animacy systems in Amerindian languages are based on the membership of nouns into two groupings, depending on whether a particular noun is considered as living or nonliving. In practice, there are often exceptions to the rule. For example, Cree has groupings of nouns which are arbitrarily animate, even though they are basically inanimate. Words such as *kettle*, *snowshoe*, and *pipe* are viewed by Cree speakers as being [+animate], perhaps by association with the [+animate] users of these articles. In Blackfoot, animals and humans are considered as [+animate], but parts of the living human or animal body are seen as [-animate].

English does not formally conceptualize animacy in ways similar to Amerindian languages, although it does reflect some human vs. nonhuman notions in its pronoun system. *Who*, as a relative pronoun, refers to a human (and animate) antecedent, and *that* and *which* refer to both human and nonhuman antecedents. *It* as a subject or object pronoun is used in English to refer to both inanimate objects and animals or babies. The effective use of pronouns in English depends on being able to sort out humans from the rest of reality, rather than distinguishing what is living from what is not living.

The concept of animacy was encoded in the MAL by means of a known English encoding process. This process consisted of a prenominal particle similar to a determiner.

2. Encoding Process

Morphologically conditioned inflections used to indicate plural.

Plural is a semantic intention which speakers of English expect to find encoded in language. In this experiment, the expected semantic intention was marked in unexpected ways--namely, by means of separate morphologically conditioned plural forms for arbitrary noun classes.

Many natural languages have numerous classes to which nouns are assigned for the formation of plural forms. For example, modern German has eight pluralization patterns into which nouns are grouped (Haas & Mathieu, 1980). For the beginning learner of German, there may at first appear to be no logical reason why a particular noun belongs to any given plural grouping. Modern Standard Arabic is an example of a language having large numbers of pluralization paradigms. Arabic has 29 separate pluralization forms, many of which may be used with several different singular paradigms (Wright, 1962).

English is not without its own complicated plural patterns in pairs such as *man-men*, *child-children*, *mouse-mice*, *deer-deer*, *criterion-criteria*, etc. Such plurals can be considered as morphologically conditioned variants, and are usually considered as irregular. These plurals are no longer productive patterns for new items entering into English. The regular plural in English is usually considered as phonologically conditioned in that the forms /-s/, /-z/, and /-əz/ are governed by the characteristics of the preceding consonant, or by the [+voice] feature of a vowel when there is no preceding consonant.

Suffixation is a familiar encoding process in English. In this experiment, Plural is a known process realized by means of a complex set of forms. It was expected that the forms rather than the commonly used encoding process would produce a memorization problem for the subjects.

AT THE LEVEL OF THE VERB

1. Semantic Intention

Experiential vs. nonexperiential.

Certain Amerindian languages draw a distinction between phenomena which are within the visual range of the speaker as opposed to those which are physically remote. Sapir (1921) describes this concept as it exists in Kwakiutl. In a sentence such as "The farmer kills the duck", a speaker of Kwakiutl must obligatorily indicate whether the farmer and the duck can be immediately perceived visually by the speaker, or whether both are located beyond his "visual horizon". Lhasa Tibetan and Japanese speakers must also express similar experiential or truth value notions in their language. Scott Delaney reported in a paper presented to WECOL (October 20, 1984) that verbs in Lhasa Tibetan express an "evidential" semantic intention in which events are described according to whether they are based on the speaker's direct perception through sight or sound, or on the incontrovertible result of an assumed event. There is also a verb marker in Lhasa Tibetan which is used to establish that an event is based on report or inference.

Japanese uses sentence-final particles similar to a modal auxiliary to state that an event is being reported by the speaker without judgement, or that an event is based on objective evidence, or finally, that the event is based on subjective evidence ("looks like, sounds like", etc.). No particle in a sentence implies that the speaker has experienced the event in question, or knows it to be true (personal communication, Michiko Kawashima).

The experimenter decided to generalize the types of semantic intention described above to include all of the senses (visual, auditory, tactile, olfactory, and taste) in order to give it a wider conceptual foundation (greater applicability). Again, note that the familiar English process of an auxiliary verb was the encoding process.

2. Encoding Process

Infixing with vowel reduplication used to indicate past tense.

As with Plural, English speakers expect to mark Past in language. What is unexpected is the process used to encode this familiar concept, in this case, infixing plus reduplication. Various world languages form past tense in a number of ways. These extend from virtually no changes to the verb form, as in Japanese (Jorden, 1963), to elaborate affixes and infixes, as in Turkish (Lewis, 1967) and Shilḥa (Applegate, 1958). Although English uses a number of irregular suppletive forms of the past tense such as *go-went*, *throw-threw*, *hit-hit*, which involve vowel alternations with or without a suffix, or no change, the regular English past tense is a phonologically conditioned suffix. Thus, *dance* gives *danced*, and *close* gives *closed* as a past form. A different type of process will be used in this experiment. Instead of a suffix, an infix of the variety C+reduplicated stem vowel will be used.

AT THE LEVEL OF THE SENTENCE

1. Semantic Intention

Generational hierarchies.

Societal and family hierarchies are marked in language by different cultures and world languages. Some linguistic systems reveal a very complicated view of interpersonal relationships that have been formalized in language. Many of these social relationships reflected through language, as previously mentioned, are far too complicated to be taught independently of an indepth knowledge of the culture involved (see Korean example mentioned in section B, Semantic Intentions, earlier in this chapter) Others are less complicated. For example, Blackfoot marks four different family and societal distances from the speaker (Uhlenbeck, 1978). Most Romance, Slavic, and Germanic languages have a second person singular verb form corresponding to Old English "thou", which designates friends and family, as well as a formal "you" (either singular or plural), which includes all others.

English no longer has the "thou" form in current usage. However, there are many subtle shifts in sentence length, voice loudness, pitch, choice of lexical items, etc. which serve to establish social distance or closeness between speakers and hearers.

The semantic intention chosen is a compromise between the more elaborate societal conventions mentioned above and the systems of registers used in English. A difference between three generations (younger-than-speaker, speaker's peers, and older-than-speaker) was marked in the MAL in forms of direct address. In the experimental group of subjects, teacher, and observers, there were at least two distinct generations (subjects' peers and subjects' elders), as well as the possibility of using pictures to show babies and grandparents. Encoding was by a lexical item in the position of the English sentence-final adverb.

2. Encoding Process

SOV word order.

In the case of SOV, learners were confronted with a known process, namely word order, since English is a language using fixed word order. What was unfamiliar was the exact form of that encoding process. In the experiment, this unfamiliar form was SOV, as opposed to the familiar SVO. A large number of world languages use SOV word order. About one-third of Greenberg's 30-language sample were SOV languages. English is an SVO language, and it was felt that a major reordering of sentential elements might prove to be an interesting experimental variable.

In choosing SOV word order, the experimenter was aware that two of Greenberg's (1963) linguistic universals were relevant to SOV languages. The two universals are the following:

> Universal 16: In languages with dominant order SOV, an inflected auxiliary always follows the main verb.
>
> Universal 27: If a language is exclusively suffixing,

it is postpositional; if it is exclusively prefixing, it is prepositional.

As mentioned, the MAL incorporates the variable Experiential, encoded by means of an auxiliary verb preceding the main verb, and Plural inflectional suffixes. In order to satisfy the constraints of these two universals associated with SOV word order, the auxiliary verb encoding Experiential would have to follow rather than precede the main verb and Plural suffixes in the MAL would occasion the use of postpositions rather than prepositions. However, neither of these concomitant universal features of SOV word order were included in the MAL. The implementation of Universal 16 would have prevented the use of a known encoding form for Experiential (the subjects "knew" that in their L1 auxiliary verbs precede the main verb) and created a dependency between SOV and Experiential. Universal 27 was rejected as well since the MAL was not exclusively suffixing: in fact, the only suffixes used in the MAL were noun suffixes. Finally, the embodiment of these two universals would have given a distinctly nonEnglish character to the language, which was to be kept as English as possible with the exception of the lexicon and the six variables. For the above reasons, Universals 16 and 27 were not incorporated into the MAL, in spite of their association with SOV word order.

As mentioned previously, French uses SOV word order in the case of affirmative declarative sentences containing direct or indirect object pronouns. Since all of the subjects in the main experiment had studied French formally in school, the experimenter was concerned that knowledge of French might have given them prior contact with SOV word order. In order to establish subject awareness of French pronoun order, all subjects were informally tested on this point. Only one subject, MU, was aware of a different word order in French resulting from pronoun objects in a sentence. This was noted for its possible effects on MU's patterns of learning of SOV word order.

In summary, new and unexpected encoding processes and/or forms and new semantic intentions were investigated in the way that they affect three major constituents. Nouns in this experiment included the concept of animacy and assigned plural number by means of morphologically conditioned suffixes. Verbs included the concept of experiencing or nonexperiencing of reality and formed past tense by means of a system of infixing with vowel reduplication. Sentential complications involved the establishment of generational honorifics and a major reordering of SVO consituents.

In the novel semantic intention experimental group, the following order of learning difficulty is predicted from easiest to hardest for the following reasons:

1. Animacy is predicted to be the easiest variable to learn in the experiment because it is a more basic notion than the other two variables, and involves the learning of an invariant categorical concept. That is to say, an object is either [+animate] or [-animate].
2. Generational is predicted to be the next hardest variable, because its use will require the learner to perform a situational assessment of generational differences between speaker and hearer in forms of direct address.
3. Experiential is predicted to be the hardest variable, since it requires a constant comparison between an event and the speaker's perception of how the event relates to his senses.

In the other experimental group, novel encoding processes and forms, the following order of difficulty is predicted:

1. Past is predicted to be the easiest variable to learn, since some of the subjects have knowledge of Hindiba, a secret code using similar processes. It is also felt that Past will be easy to learn because its correct use depends on the application of a relatively compact and easily learned linguistic rule.
2. SOV is predicted to be the next hardest variable in

this group. This prediction is based on the premise that SOV involves the movement of major constituents, rather than elements within a major constituent.

3. Plural will probably be the hardest variable to learn, because its many forms are unpredictable and must be memorized.

These assumptions will be tested in the next chapter.

C. Description of the Concept-formation Study and the MAL Taught in this Experiment

Concept-formation Study

Prior to conducting the main experiment in which the learning characteristics of different task variables were investigated, the author carried out a concept-formation experiment. The subjects for the concept-formation experiment included those who later learned the MAL and the concept-formation study was a part of the main MAL experiment described later in this chapter, in that it acted as a training session which formalized and labelled the three new semantic intentions to be included in the MAL for the primary subjects, and made sure that they knew them (the purpose of the MAL experiment then was to determine whether subjects remembered to encode these unexpected semantic intentions in appropriate circumstances). The concept-formation experiment sought to answer the following questions:

1. What are the patterns of establishment of the [+] and [-] values of the three concepts being investigated in the main experiment? Can any comparison be made among the three concepts?
2. Do age and sex differences affect how subjects form concepts such as the three listed above?

Concept formation is an established experimental technique in which subjects are confronted with a set of stimuli to be divided into two or more classes established beforehand by the experimenter. The subject accomplishes this classification by applying concepts which he already possesses through his past experience of the world and by using some form of search procedure in dealing with the new stimulus material. The experimenter uses differential reinforcement in order to guide the subject in focussing his attention on some particular aspect of the stimuli relative to the concept or concepts in question.

For example, in a concept-formation experiment subjects may be presented with a series of different coloured shapes used by a experimenter to investigate the formation of the concept "red-coloured shapes". Initially, the subject does not know which aspect or aspects of the stimuli are the relevant ones, and must simply guess at each trial whether a particular stimulus is a member of the target group. The investigator's responses to these preliminary guesses guide the subject to progressively include or exclude the parameters necessary to form the concept. In this case, the parameters are based on colour and shape.

The usual performance measure in a concept-formation study is the number of trials required to reach a certain criterion. In the study reported below, a trial consisted (in the first two parts) of one picture and a response. In the second part, a trial consisted of a sensory presentation and a response. The criterion for having formed the concept was set as ten consecutive correct responses.

SUBJECTS

In all, 26 subjects, 11 males and 15 females, participated in the study. The average age of the subjects was 19.27 years. Each subject belonged to one of three age groups: 9-12 years, 13-18 years, and 30-45 years. These three groups corresponded to the theoretical learner groups of preadolescents, adolescents, and older learners. There was approximately the same number of males and females in each group. The youngest group contained five subjects, in the adolescent group there were 16 subjects, and in the oldest group there were five subjects. Members of the preadolescent and adolescent group were all full-time students in the Edmonton Public School System. All subjects came from middle-class backgrounds. As noted below, this group of 26 subjects included in the preadolescent and adolescent categories a sub-group made up of the nine subjects who were also a part of the main experiment.

PROCEDURE

In order to judge the ease of learning of the three concepts as "pure" concepts rather than language embedded concepts, the experimenter devised a three-part task involving two sets of pictures and a series of paired actions. The first part used a stimulus set comprising 52 pictures of various animate (in the sense of living) persons, plants, animals, and inanimate objects. The two stimuli groups were approximately equal, with 29 pictures exemplifying the [+animate] category, and 23 pictures showing the [-animate] category. The second part investigating the generational concept was made up of 23 pictures, of which 12 were pictures of babies, younger children, and adolescents in the "younger" group, and 11 were pictures of middle-aged persons, and grandparents forming the "older" group. In each picture, there were members from only one age group. In the last part of the experiment, the experimenter presented stimuli for the five senses in pairs. Presentations were conducted on the following format: a subject was asked to smell perfume in a bottle, and then asked to hypothesize whether the act of smelling perfume was, or was not, an example of the concept in question. The perfume bottle was then taken out of the range of scent of the subject, and again opened. The subject was again asked if what was taking place was an example of the concept in question. This type of paired presentation was repeated for visual, auditory, tactile, and taste sensations.

In this study, each semantic concept was viewed as being composed of two sub-concepts, which together formed a unified single concept for the learners in the main experiment. Animacy was tested as a concept on one-half of the subjects in the form [+animate], and the other half was asked to form a concept with the target group [-animate]. Similarly, the generational concept was presented through two target groups of members of the older generation as opposed to the younger generation. The experiential concept was presented as pairs of sensory experiences, each one of which was either present or absent. In all, there were six sub-tasks in the study. This allowed the comparison of [+] and [-] versions of each concept.

Each subject was tested separately, and conducted through all three concepts of the test. At the beginning of the study, subjects were told that they would be shown a series of pictures, and later, a series of actions. The subject was told that the pictures and actions were examples of something that the experimenter was thinking about. He was then asked to hypothesize whether a picture or an action was an example of this idea, and was informed that after each hypothesis he would be told if the hypothesis was right or wrong. To illustrate how this would work, the experimenter gave the example of how things colored red could form a target group among pictures of different coloured objects. Subjects were told to answer "no" to the first stimulus item of each set.

In order to give a concrete example of the nature of the task, subjects were shown a set of 12 pictures of various geometric shapes, one-half of which were different sized triangles. The target set was "triangle", and on an average, this concept was formed by subjects within 5.13 trials. The experimenter considered that the concept had been successfully formed from the moment that ten consecutively correct answers were given in response to test stimuli. Subjects were asked at periodic intervals if they could verbalize the concept being sought. In the case of the triangles, the moment of verbalization of the concept and continuously correct answers nearly always coincided. This was not the case, however, with the tests which followed.

Subjects were chosen for the study in such a way that there were approximately the same number of males as females in each of the three age groupings. Each of the six target groups was equally divided by age group and sex. The order of tests was not varied. Each subject did the tasks in the order (i)Animacy, (ii)Generational, and finally (iii)Experiential. The experimenter's wife noted all responses and hypotheses as they were given by the subjects.

RESULTS

Averaged across subject age groups and sex, the difficulty of the subconcepts according to the number of trials required to form the concept (10 consecutively correct answers) was as follows:

[-animate]	71.77
[+animate]	21.85
[generational=old]	9.38
[-experiential]	4.23
[+experiential]	4.17
[generational=young]	2.31

The [-animate] subconcept was significantly harder ($p<.001$) to form for the subjects than the [+animate] subconcept. In the Generational concept, the [generational=old] target group composed of middle-aged individuals and grandparents was significantly harder ($p<.05$) to form than the [generational=young] subconcept comprising babies, younger children, and adolescents. There was no significant difference between the [+] and [-] Experiential subconcepts. Animacy and Generational both used the same task, and for this reason they can be compared. Contrary to the experimenter's expectations, Generational was easier to form than Animacy.

Males were able to form the [+animate] group more quickly than females (males=6.0 vs. females=31.75), as can be seen in Table 2.1. Females, however, found the [-animate] concept easier to form than did males (females=67.0 vs. males= 77.33). There were no appreciable differences between males and females in the other tasks of the experiment. None of these differences between males and females in the concept-formation study was significant.

As concerns age differences, the adolescent and middle-aged groups were, on the whole, better concept formers than the 9-12 year old group (see Tables 2.2, 2.3). There was one notable exception to this generalization. In the hardest target group of the experiment, [-animate], the youngest subjects required 20% more trials to form the subconcept than did adolescents, who were the best in this subtask. However, the oldest group required even more trials than the youngest subjects: in fact, 55% more trials. Across all six subtasks, the superiority of the adolescent group was not maintained. The youngest group did best on only one of the target groups ([generational=old]), whereas adolescents did best on two target groups ([-animate] and [-experiential]). The superior group of concept formers was the 30-45 years group, who performed the best on three of the six target groups, or one-half of all of the subtests ([+animate], [+experiential], and

TABLE 2.1 SUCCESS ON CONCEPT FORMATION TASK; MALES VS. FEMALES

CONCEPTS

	+ANIMATE	-ANIMATE	GEN=OLD	GEN=YOUNG	+EXPER	-EXPER
FEMALES	31.75	67.0	7.29	2.25	3.71	4.71
MALES	6.0	77.33	11.83	2.40	4.80	3.67

TABLE 2.2 COMPARISON OF SUCCESS ON CONCEPT FORMATION TASKS BY AGE GROUP

	CONCEPTS					
	+ANIMACY	-ANIMACY	GEN=OLD	GEN=YOUNG	+EXPER	-EXPER
9-12 YEARS	41.5	76.0	5.0	2.67	5.0	10.0
13-18 YEARS	22.88	63.5	6.38	2.63	4.29	2.89
30-45 YEARS	6.0	98.5	20.33	1.0	3.33	4.5

TABLE 2.3 COMPARISON OF SUCCESS ON CONCEPT FORMATION TASKS BY AGE GROUP

	CONCEPTS					
	+ANIMATE	-ANIMATE	GEN=OLD	GEN=YOUNG	+EXPER	-EXPER
9-12 YEARS			X			
13-18 YEARS		X				X
30-45 YEARS	X			X	X	

NOTE: X= BEST PERFORMANCE ON A CONCEPT

[generational=young]).

CONCLUSION

Concerning this study, which attempted to find a language-independent measure of the difficulty of forming the [+] and [-] subconcepts of Animacy, Generational, and Experiential, the following comments can be made. The concept of -Animate proved to be the most difficult to form. This could be caused by the amorphousness of the members of the group which ranged from lakes to lawnmowers. With one-half of the subjects in this group, the experimenter was obliged to stop after two complete passes of the 52 stimulus cards and sort them into two groups of "yes" and "no" cards. When the [+animate] group was available as a comparison, subjects appeared to have the information necessary to arrive at the correct concept. In fact, the only subject who managed to form the [-animate] concept after only six cards reported that she consciously paid attention on her own to the nontarget group. It is interesting to note that the easier form of this concept, [+animate], was still twice as hard to form as the next easiest concept, [generation=old].

The Generational concepts may be compared with Animacy, since the same task was used to test them. Both Generational subconcepts were perhaps easier than Animacy because they could be formed in the trials from pictures of a unified group of humans. It is interesting to note, as is shown in Table 2.2, that the youngest age group was the fastest to form the concept of [generational=old], and that the oldest age group was the fastest to form the concept of [generational=young]. This finding seems to suggest a heightened reciprocal awareness between the younger and older generations in our society. It is difficult to know whether this increased ability on the part of the two generations comes from cultural reasons, or other unexplained factors.

The two Experiential target groups were the easiest of the three concepts to form when their results were averaged. This may be because of the way in which the two target groups were presented, which differed from Animacy and Generational. As explained earlier, trials for this concept consisted of pairs of presentations in which each sensory stimulus was alternatively present or absent. This type of presentation may have served to give an unfair advantage to this concept.

A secondary measure of the difficulty of forming a subconcept was available in the extra number of trials (cards or actions) required by subjects before being able to verbalize a given subconcept, even though consistently correct answers were being given. It was usually obvious to the experimenter through the speed of subject answers when a concept had been grasped.

However, the experiment was continued until the subject could correctly verbalize the concept.

For the [+animate] and [-animate] target groups, the subconcepts were always verbalized by subjects in terms of living or nonliving. There was only one exception. One of the subjects, who did not participate in the principal experiment, had come into contact as a child with Cree. This subject defined his target group as "animate", suggesting that he possessed metalinguistic knowledge of Cree. A number of subjects developed and eventually abandoned various hypotheses as to the nature of the target group. Such hypotheses or concepts were material vs. nonmaterial, food vs. persons, things in the house vs. things outside of the house, and more detail in a picture vs. less detail.

The generational target groups were verbalized as children vs. grown-ups, old vs. young, and younger vs. elderly. Other concepts were also formulated for the stimuli: active people vs. passive people (the grandparents were all seated in the pictures), serious people vs. happy people, inside vs. outside, and finally people who are eating vs. those not eating. The experiential target groups were always formulated as senses vs. nonsenses or lack of senses. Subjects did not form any other concepts for these last groups.

The results given below show that [-animate] continued to be the most difficult concept, since a physical sorting of the cards was usually required before verbalization of the concept would be produced. The difficulty of the subconcepts is still maintained as shown earlier. However, [generational=young] is no longer the easiest subconcept. In the verbalization of the concepts, Animate is clearly harder than Generational. The figures below represent the number of trials necessary from the moment that consistently correct responses were given until the target concept could be formulated.

[-animate]	--
[+animate]	13.92
[generational=young]	5.09
[generational=old]	4.75
[-experiential]	3.40
[+experiential]	1.56

In this group of subjects, the oldest subjects in the age group 30-45 years were the best concept formers. They were followed by adolescents, who were one-third less successful. It should be noted however that it was the adolescents who excelled in the hardest target group of the experiment: [-animate]. The least successful group was that of the subjects 9-12 years of age. These subjects were two-thirds less capable as concept formers than were the oldest subjects. This relatively poor performance by the preadolescent group agrees with

Piaget's theory that abstract concept formation is less highly developed in children before the age of puberty than in adolescents who have entered what Piaget defines as the formal operations stage. This experiment demonstrates that ability in forming concepts is a function of age. This concept-formation study suggests that even with only two of the three age groups as subjects, factors such as age and sex of subjects (learners) and relative difficulty of concepts must be considered in addition to difficulty of encoding forms in learning an L2. Such information is important from the point of view of L2 development, since the formation of the concepts involved in novel semantic intentions in an L2 is a part of the learning task. The results of this small experiment will be discussed further in the following chapter.

Description of the MAL Used in this Experiment

Brief History of the Use of MALs

MALs have been used for many years as a research tool by psychologists and linguists interested in investigating cognitive and linguistic processes. As McLaughlin (1980) points out, one of the advantages of the use of such languages is that the material under investigation is simplified, and as a result, uncontrolled variables are minimized. A typical MAL is composed of from 5 to 20 elements existing in a symbolic system. The referential field, when there is one, is completely visual and is usually composed of different geometric shapes of varying colours. Subjects learn a "grammar" composed of a number of grammatical strings, and are then tested to see if they have learned the rule system underlying the "grammar" (Moeser, 1977).

The MALs used in language research have been far less semantically and syntactically complex than natural language. It can scarcely be said that twenty elements are representative of the lexical richness of any existing natural language. An entire MAL such as those found in the research of such well known investigators as Braine are typically taught and tested in one brief session of a few hours.

A number of criticisms have been directed at the use of MALs by Slobin (1971) and Schlesinger (1977). As mentioned earlier, the MALs of the 1960s and 1970s tended to either totally lack a referential field, or used a referential field composed of different coloured geometric shapes. Conspicuously absent from MALs have been actions, or any real use of the MAL as a communication system. Both Schlesinger and Slobin have been sceptical as to whether the results of the MAL systems used up to the present time can be extrapolated to complex systems such as those existing in natural language.

The author is generally in agreement with these criticisms. In the author's personal experience, however, natural language contains too many interacting variables to permit its use in an experimental condition such as the one required here. The simplification of language is the only means by which a few variables can be separated out from the complexity which characterizes natural language. This can only be accomplished through using a reduced form of language in the shape of a MAL.

There are, on the other hand, many ways in which a MAL can be designed to approximate more closely the substance and functions of a real language. Listed below are the features incorporated into the MAL used in this experiment which make it possible to consider it as a close approximation to an actual language.

1. *Semantic fields.*

   The norm of the MALs designed for psychological and linguistic research is that of a "semantic vacuum." Rather than a semantic field composed of shapes and colours, the normal, if restricted, referential field of the beginning L2 was made up of pictures of humans, animals, and events. This representation of reality was supplemented by actions performed by the subjects, as well as by objects which were physically present in the learning environment. Unlike other MALs, this system, similar to real language, incorporates classes of elements into its structure. For example, one referential field developed around "family kinships" includes terms for brother, sister, mother, father, cousin, etc. Another field gives the possibility of discussing the home and events occurring in the home environment. These fields will be more fully discussed below.

2. *Learning and testing time.*

   The time spent in learning and testing of experimental MALs is usually in the order of a few hours. It is difficult to generalize about language or cognitive processes on the basis of such limited research. Bearing this problem in mind, learning times were extended to cover a one-week period of full-day classes. The effects of time on the L2 learning process have not been well researched. However, the results of a period of approximately 14 hours of L2 learning activity will permit the researcher to make more interesting generalizations about the variables being investigated in this study.

3. *Number of lexical elements and syntactic patterns in the MAL.*

   As discussed earlier, the number of lexical elements in a typical MAL number about 20. The MAL of this experiment contains 230 lexical elements and a sufficiently large set of natural language-like syntactic patterns to make normal communication possible. The elements combine in ways characteristic of natural language. That is to say, there are classes of nouns, verbs, adjectives, adverbs, and articles, all of which are found in natural language. It must be admitted that even this number of lexical items in no way approaches the number of elements present in a real language. However, to compensate for the limitations which this number of items imposed on communication, the author had ready during the teaching/learning period a list of lexical "shells" into which any required referent could be plugged should the need arise. In fact, subjects did require a number of new words which had not been forseen by the researcher. In the course of teaching the MAL, the author did not experience the feeling that the elements provided were in general insufficient for communication, or that communication was being impeded.

4. *The MAL as a communication system.*

This feature is what differentiates other experimental MALs from the one developed for this study. The MAL of this study is sufficiently simplified to investigate a limited number of variables, yet rich enough to be used as a communication system. The subjects used the MAL as a means of communicating ideas in the language classroom, and then later on, outside of it, and quite unprompted, as a secret language.

In summary, this MAL was constructed in such a way as to answer a number of justified criticisms of past use of this technique. Although simpler than natural language, the MAL is language-like, containing a relatively large referential field of pictures of humans, animals, objects, and events grouped into semantic classes. It was taught in a long enough time to allow its use as a tool for communication. Overall, the MAL resembled in many respects what is usually taught in the beginning phases of an L2 class, i.e. limited and concrete lexical items, a limited range of syntactic structures, and the use of simple sentences with little coordination and no subordination. Finally, the fact that some of the subjects continued to use the MAL as a secret language after completion of the experiment attests to the success of this system as a language-like means of communication.

Grammar of the MAL

Except for the variables and the lexicon, all elements were kept as "English" as possible. The variables described earlier in section B are the framework around which the rest of the MAL was constructed. The grammar can best be described by discussing again the three levels NP, VP, and S.

1. *NP*:

A noun phrase consists of the following elements:

$$\left[\begin{array}{l} \begin{bmatrix}\text{NUM}\\ \\ \text{ART}\end{bmatrix} + (\text{ADJ})* + \text{ANIM} + \begin{bmatrix}\text{N anim}\\ \\ \text{N inan}\end{bmatrix}\ (+\text{PL}) \\ \text{PRON}\end{array}\right]$$

In first position in noun phrases, one finds either the definite article *en*, which is both singular and plural, or the indefinite article *den* for the singular and Ø for plural. Numerals can also occupy this position, and are invariable. Articles and numerals are mutually exclusive. The second element in the noun phrase is occupied by one or many adjectives. Adjectives are invariable. The third element of the noun phrase is an obligatory animacy marker. This marker uses *ta* when the following noun is living [+animate], as in the case of humans, animals, and plants, and *po* when the following noun is nonliving (dead humans, animals, plants, and all inanimate objects). Nouns occupy the third slot in an NP. They can be used in the singular with no ending or with a plural suffix, which is attached directly to the stem. Pronouns are also marked for animacy. The following sentences are examples of lawful NP constructions:

(1) *En henk ta catso*
The silly [+anim] teacher
(2) *Den po tori*
A [-anim] house

(3) *Boun ta pugen*

Two [+anim] boys

(4) *En po feak*

The [-anim] clock

(5) *Po feakas*

(some) [-anim] clocks

(6) *Ta catsou*

(some) [+anim] teachers

In this MAL there are five classes of plurals: *as*, *a*, *u*, *en*, and s. The 94 nouns were assigned to each plural class on a random basis, each class containing about 18 nouns.

2. *VP*:

The verb phrase is composed of the following elements:

EXP + VERB +(TENSE) +(ADV)

(See Appendix D for the optional adverb front shifting transformation to shift adverbs to sentence-initial position)

EXP, denoting "experiential", and occupying the AUX position, is modal in character in that it indicates whether the speaker is experiencing by means of his senses the objects, persons, or actions of the utterance in question. Two forms are used to denote the experiential concept: *sha*, and *nop*. *Sha* is used to indicate that the speaker can see, hear, touch, feel, smell the action described by the following verb, or preceding noun(s). For example, in (7) below, *sha* states that the speaker is seeing, or in some way sensorily experiencing the teacher's presence as he (the teacher) walks. In (8), *nop* indicates that the speaker is not, or has not very recently seen or heard the teacher looking at television. This would correspond to "I hear that...", or perhaps "Rumour has it that...". EXP is obligatorily present in all sentence types, including questions and commands. Example (9) states that a certain door within the range of speaker-hearer senses is to be closed.

(7) *En ta catso sha sneap*
The [+anim] teacher [+exp] walks
(8) *En ta catso ko en po rame nop folt*
The [+anim] teacher at the [-anim] TV [-exp] looks
'The teacher looks at the TV.'
(9) *Sha blate en po chine*
[+exp] close the [-anim] door

The experimental MAL has tense, specifically present and past tense. Adverbs, when they are used, come immediately after the verb or in sentence-initial position. Past tense is formed by a process of infixing and vowel reduplication. To form a past tense, subjects had to locate the first vowel in the verb stem, then immediately before this vowel place "Vm", where V is a copy of the first vowel in the stem followed by the consonant [m]. To illustrate this process, the first vowel of *sneap*, 'walk', is [i]. To form the past tense of this verb, one would place before 'ea' the combination 'eam' to give *sneameap*, [snimip]. Sentences (10) and (11) illustrate the use of adverbs and past tense infixing in the MAL:

(10) *Den ta catso nop omorthal ter*
A [+anim] teacher [-exp] write-[past] slowly
'A teacher wrote slowly.'

(11) *Ta lo sha simikal fleam*
[+anim] he [+exp] telephone-[past] yesterday
'He telephoned yesterday.'

3. S:

A sentence in the MAL is composed of the syntactic arrangement SOV. The O component is, in fact, a complex containing direct objects, indirect objects, and prepositional phrases. The following order within O was adopted, somewhat arbitrarily: direct object<indirect object<prepositional phrases. Sentences such as (12) to

(14) below are representative of what subjects were asked to learn:

(12) *En ta pug sha sneap*
The [+anim] boy [+exp] walks

(13) *En ta pug nat en po thring sha sneap*
The [+anim] boy to the [-anim] store [+exp] walks
'The boy walks to the store.'

(14) *En ta zena en po boist bo en ta*
The [+anim] girl the [-anim] ball to the [+anim]
lask nat en po ti sha shenk
baby in the [-anim] school [+exp] gives
'The girl gives the ball to the baby in the school.'

The verb *metsa*, 'to be', was treated as the only exception to SOV order in this language. Sentences containing the copula used SVO order, as can be seen in the following example:

(15) *En ta pug nop metsa nat en po thring*
The [+anim] boy [-exp] is in the [-anim] store

All other verbs required the use of SOV in all sentential forms. This was done to determine to what extent the process of overgeneralization was occurring, and at which point this process would make itself felt. The results of this will be reported in the next chapter.

In this language, Generational operates as a sentential particle. The generational particle occupies the end of a sentence, with Q (*ag*) and NEG (*sen*) in free word order. Although this sentence-final location for Q and NEG is not typical of English, these two structures were not scored. They were placed here in order that the subjects would append them at the end of the sentence after the more difficult encoding had been performed. The generation function is only operational in commands and questions; i.e. in sentences involving direct address. The markers for this function are *pat*, used by older persons to younger persons (younger by at least one generation) and *teg*, used by younger persons to older persons. Speakers and hearers of the same age group do not require a generational marker. Sentences (16) to (18) illustrate this function:

(16) *Nop sneap nat en po thring pat*
[-exp] walk to the [-anim] store [gen=young]
(the store is not visible, and the addressee
is younger than the speaker).
'Walk to the store!'

(17) *Sha blate en po chine teg sen*
[+exp] close the [-anim] door [gen=older] NEG

(or *sen teg*)

(The door is visible, and the addressee is older than the speaker)

'Don't close the door!'

(18) *Nop* *metsa ta* *vo* *sneap nat en* *po*

[-exp] are [+anim] you going to the [-anim]

thring pat *ag* (or *ag pat*)

store [gen=young] Q

'Are you going to the store?'

Commands in the MAL were formed using English word order. The experiential marker continued to be placed before the main verb as with noncommands, which meant effectively that *sha/nop* always occupied sentence-initial position in commands. The reason for maintaining English word order in commands was to determine to what extent subjects would generalize SOV word order to other sentence constructions in spite of instructions to the contrary.

L2 Phonology as a Variable

The L2 learner is not always confronted with the problem of learning a radically new sound system. Although no two languages probably ever have identically the same phones and phonemes, the L2 learning situation is sometimes characterized by the lack of a need to master radically different language sounds as in the case of a L1 speaker of Ukrainian learning Russian. However, it is more likely the case that the learning of an L2 will entail the mastery of phonemic and phonological systems which are different, even radically different from those of the L1.

In order to make a complete statement about L2 learning, this experiment would have to consider the effects of the L2 sound system on other variables. In an earlier unreported study conducted by the experimenter, it was found that Anglophone subjects who were asked to learn substantial amounts of new French L2 material tended to be quite concerned with the correctness of their pronunciation, to the detriment of other aspects of L2 learning. The great importance of pronunciation as a contaminating variable led the investigator to conclude that even at the risk of conducting a less complete experiment, it would be advisable to eliminate pronunciation problems in order to be able to isolate those factors which are of interest in this study. This decision does not deny the role which the learning of L2 phonology has on the learning process. It states rather that this aspect of L2 learning is felt to be too large to manage within the scope of this particular study, particularly from the point of view of time.

For these reasons, the phonology of this MAL was taught as though it were an extension of English. The lexicon was presented in English sounds, written and read as though the words existed as new words in an English dictionary. Subjects were told that they could read words as though they were reading an English text. In cases where pronunciation of a word in the MAL was in question, subjects as a group decided together what the acceptable pronunciation would be, but always on the basis of English sound laws. It may be noted in passing that once the group had decided on how a problem word was to be pronounced, individuals seldom ever varied from the accepted convention.

Lexicon

In designing the vocabulary for the MAL, the paramount consideration was how to develop a tool which would allow the maximum amount of individual expression and exchange of information by subjects. With this in mind, the elaboration of a lexicon was done in three separate phases:

(1) the development of interest areas and items within such areas;

(2) a word frequency study of the English lexicon to insure use of high frequency items;

(3) giving a form and phonetic shape to referents, once chosen.

1. Phase 1: Development of Interest Areas.

Since the subjects were preadolescents and adolescents aged 9 to 15 1/2 years, the author concluded that it would be best to construct the lexicon around a number of general interest areas relating to their experience in the real world. It seemed a reasonable assumption that subjects would be the most expansive about known experiences, experiences which they could relate to and subsequently talk about.

For the above reasons, principal vocabulary areas or semantic fields and three minor areas were elaborated. These were:

(1) family kinships (sister, brother, mother, father, etc.);

(2) the home (house, bed, lamp, bike, boy, girl, TV, car, cat, dog, play, ball, etc.);

(3) school, its activities, and occupants (book, school, teacher, homework, work, question, answer, read, write, etc.);

(4) the environment immediately adjacent to the home (store, tree, bus, road, lawn, garden, house, bird, friend, office, etc.);

(5) the physical body (hand, finger, nose, ear, eye, body, etc.).

Within (2) above, the vocabulary of the home, there were three further semantic subfields:

(i) clothing (shoes, coat, dress, shirt, etc.);

(ii) play (ball, toy, game, play, etc.);

(iii) eating (sandwich, cup, lunch, drink, eat, meal, etc.).

The total list of nouns and verbs was supplemented by the numbers one to ten, some common adverbs, adjectives, and prepositions, and finally, a subject and object pronoun system.

2. Phase 2: Word frequency counts.

In order to insure that lexical items used in the experiment would be amenable to communicative purposes in the experiment, the list of words generated in phase one was compared with three word frequency lists: Carrol, Davies & Richman (1971), Kučera & Francis (1967), and Rinsland (1945). Those words which had a relatively low frequency value across all three frequency lists were deleted from the list of lexical items on the assumption that if a given word has a low frequency in a large sample of words across many subpopulations, it probably would not be used very frequently in communication. Words such as *mow*, *lawn*, *wristwatch*, and *dictionary* were eliminated from the lexical list and other words such as *buy*, *call*, and *bring* were added, since such words have a high frequency of occurrence in English, and seemed to complement the original working lexical stock. A small number of words were included, even though they had negligible frequency counts, because the concepts were recent newcomers to English. This was the case for *jeans* and *homework*.

3. Phase 3: Assignment of phonetic shape and written form. As discussed earlier, the effects of L2 phonology are excluded as a variable in this study. In order to accomplish this exclusion of what is obviously a factor in L2 learning, lexical items were given English pronunciation and interpreted according to English sound laws. For example, *pug*, 'a boy', was pronounced [pʌg], although subjects did in fact often attempt to pronounce

new words in reading as though they were French. The carry-over effects of an L2 phonology on L3 will be discussed more fully in the final chapter.

The experimenter had noted that Hungarian, Finnish, Old English, and Japanese contain many words with CV and CVC combinations that resemble those existing in English. Since English-like words were to be used in this study, these languages were used to supply a stock of word forms. A review of several grammars of these languages generated a list of 200 one- and two-syllable words.

Three native speakers of English were then asked to rate these words as possible English words on a scale of 1 (most acceptable) to 5 (least acceptable). The experimenter read the words aloud to the raters in order that the possible effects of a foreign appearance in form might be neutralized. The 29 words ranked at 2.5 or higher were discarded and those remaining were assigned randomly to the lexical list from phase one (see Appendix E).

At this point, the MAL was essentially completed and contained a grammar containing:

1. six variables composed of three new semantic intentions and three new encoding processes or forms;
2. syntactic rules;
3. a lexicon of semantic fields and items;
4. a phonology based on English;

5. a number of grammatical classes such as nouns, verbs, adjectives, adverbs, and tense.

D. Subjects

Nine subjects were available to the experimenter, of whom four were adolescents aged 13 to 15 1/2 years, and five were preadolescents aged 9 to 12 years. For the purposes of this experiment, "adolescent" is defined as an individual who is 13 years of age or older. The term "preadolescent" is used to designate a subject who is 12 years of age and younger. The average age across the whole group was 11 years, 11 months, and the age spread from youngest to oldest was 6 1/2 years. There was one male aged 12 years in the preadolescent group and one male aged 15 1/2 years in the adolescent group. Of the females, four were in the preadolescent group and three were in the adolescent group. All nine subjects came from stable middle-class homes, in which the fathers were employed as teachers, accountants, engineers, and businessmen. Mothers of the subjects were homemakers, or employed on a full-time or part-time basis as nurses or teachers.

All of the subjects volunteered to participate in the experiment, which they were told would last one full week at the beginning of the summer vacation from school. The subjects were told that they would be paid for their work in the form of lunches plus $3.00 per hour. At the conclusion of the week, each subject was paid for time spent in the experiment.

All members of the group of subjects knew each other quite well, and in fact were the experimenter's three children and their friends. The subjects were old enough to be able to participate actively for a three to four hour period of classes and testing during five days, but young enough to be enthusiastic and nonanxious. The researcher was attracted by this type of subject since firstly they were readily available with a minimum amount of extra planning, and secondly because a sympathetic social surrounding was felt to be the ideal condition for rapid learning and use of an L2. This assumption proved to be correct in the experiment.

All subjects were native speakers of English, and none possessed an L2 in any meaningful way. Members of the group had been exposed to 1 to 5 years of French as an L2 in classroom surroundings. Five of the subjects had studied "Extended French" for 2 to 3 years. This type of program exposes the student to extra amounts of French, usually in the form of one extra subject such as Art or History taught entirely in French. In addition to a limited background in formal French, three of the subjects had lived for brief periods in areas where English was a minority language. One subject had spent 18 months with her family in Malaysia, but had attended Kindergarten and grade one in English schools. Servants in the home spoke English and Malaysian. Another subject had lived for a short time with his mother, a Cree speaker, on a reserve near Regina in a Cree-speaking community. A third subject had extensive contact with the German-speaking community in Stony Plain, Alberta, but claimed to have never learned very much German. These contacts were all noted for their possible influence on the learning of the experimental MAL.

One last linguistic influence coming from other languages was the fact that five of the female subjects spoke a secret language known to its speakers as "Hindiba". This language, in ways similar to Pig Latin, uses existing lexical terms in English as well as English structures, but modifies words to make them unrecognizable to noninitiates through elaborate vowel changes that work in systematic ways. The author was in the process of learning this secret language at the time when the experimental variables were being chosen. He was aware that Hindiba uses a process of vowel reduplication that could have given a slight advantage in learning the past tense to those subjects who spoke it.

In order to determine the characteristics of these subjects as potential L2 learners, each member of the group was given a battery of standardized tests and answered a questionnaire. Individual differences will be discussed in the next chapter. What follows is a résumé of group norms for each factor investigated.

1. Intelligence

Intelligence was not tested. Rather than using a test of intelligence, subjects' school grades were taken as an indication of general intelligence on the basis of the .40 correlation found to exist between IQ and school grades (Pimsleur, Sundland & McIntyre, 1963). The average scholastic grade across all school subjects for the nine experimental subjects was 67.49, with a range between 54% and 77%.

2. Aptitude

Four subjects ranked average ("chances for success in learning an L2 average") and five high ("chances for success high") on the Pimsleur Language Aptitude Battery. This group of subjects would best be characterized as having a relatively high aptitude.

3. Motivation

On the basis of the researcher's experiences during the one-week training and testing period, motivation could be termed as high. All subjects filled out a motivational questionnaire designed by Gliksman, Gardner & Smythe (1982) which on a scale of -3 to +3 showed subjects to have

(1) positive parental encouragement for learning a second language (in the case of French) (+.47)
(2) positive attitudes toward French-Canadians (+.54)
(3) positive integrative motivation (+.33)
(4) negative instrumental motivation (-.24)
(5) positive interest in foreign languages (+.48)
(6) neutral motivational intensity (+.01)

(7) negative (low) ethnocentrism (-1.2)

4. Classroom anxiety

A set of five items in the Gliksman *et al.* instrument tested this factor. Subjects reported that they were at ease in the L2 classroom, and liked to respond to teacher questions. This was shown to be the case by a positive rating of +.12. The researcher's experiences confirmed subject ratings.

5. Field dependence-independence

Two sets of tests, the Embedded Figures Test (Witkin, Oltman, Raskin & Karp, 1971) and Flexibility of Closure (Ekstrom, French, Harman, & Dermen, 1976) revealed this group to have an above-average analytical ability, and a marked tendency toward field independence.

6. Need for achievement

This factor was tested by ten items in the Gliksman *et al.* instrument. Subjects scored on an average positive values (+.47), and appeared through their answers to be a group seeking relatively high levels of achievement in all endeavours in their life.

7. General attitude toward language learning

This factor was not tested on any instrument, but was observable by the experimenter during the one-week experimental period. All subjects had a very positive attitude toward classroom activities, learning of the MAL, and seemed to view their language experiences favorably. The parents of the subjects were supportive of the experimenter's activities, even though few of them really understood the nature of the experiment.

The following generalizations can be made of the nine subjects who participated in the experiment. They were preadolescent and adolescent learners, predominantly female, all native speakers of English with limited formal contact with L2 learning. The members of the group were average academically, but possessed high aptitude, integrative motivation, analytical abilities, achievement needs, and interest in foreign languages. Subjects also had low French classroom anxiety, ethnocentrism, and instrumental motivation.

E. Training Methodology, Training and Testing Conditions

Methodology Used in Training

The choice of an appropriate teaching methodology was considered as a major issue in this experiment. Previous research has suggested that early skill strengths can result from different L2 methodologies
(Scherer & Wertheimer, 1964), even though such early advantages may disappear with the passage of time. In order to minimize the effects of an audio-lingual methodology or a methodology based on grammar-translation, the methodology developed for this purpose was an amalgam of these methods

plus a number of innovations designed to encourage early communication in the MAL. The four skills were taught and tested in the order listening, speaking, reading, and writing, as recommended by audio-lingual theorists. However, paper and pencils were always available for those who wanted them.

Certain features of the methodology developed for this experiment are unique, in that they are not used in present methodologies. Others are regularly incorporated into standard L2 textbooks.

1. A list of lexical items posted on the classroom wall

   From the beginning of teaching through to the end of testing, lists on different coloured cardboard for all of the lexical items in each category of nouns, verbs, adjectives, and adverbs were attached to the classroom wall. Students were free to consult these lists by merely looking up at the wall, where required words were posted in large letters. These lists turned out to be a great help to communication, in that the needed tools for exchange of information were immediately available and, of course, used. The implications of this for L2 teaching will be discussed at a later point.

2. A list of the rules of the language posted on the classroom wall

   In similar fashion to the posted lexical lists, a mini-grammar was posted on the classroom wall. It was constantly updated to reflect the current state of knowledge of the language on the part of the learners. This grammar was not available for use during testing.

3. Pictures

   Prior to teaching, the experimenter assembled a bank of some 2,000 pictures of all of the lexical items used in the experiment. These pictures were used heavily to encourage use of the language in soliciting answers to questions.

4. Lengthy explanations of the experimental variables

   In order to make the variables to be learned in the experiment more meaningful, the experimenter devoted an initial 20-30 minutes of each training period to explanations of each one. These were contrasted with English in order to make each one more meaningful within the subjects' current cognitive structures.

5. Mechanistic and spontaneous-communication types of language activities

   Activities of a "behavioristic" nature were also done. These included mechanical exercises such as substitutions, fill in the blank (oral and written), sentence creation, as well as translation, reading and writing exercises, and communication-oriented tasks such as skits, charades, and puppets.

A teaching session for each variable followed as closely as possible the following format:

(1) 20 minutes- explanation of the concept or encoding form, its place, examples of its use, contrasts with English;

(2) 30 minutes- mechanical exercises, pattern drills, substitutions;

(3) 30 minutes- writing exercises, reading exercises translations, sentence creation from visual stimuli;

(4) 15 minutes- review;

(5) 30 minutes- small group spontaneous communication, puppets, skits, charades, story telling;

(6) 15 minutes- miscellaneous activities.

Each 2 1/2 hour training session was terminated by a five-minute test before going on to new material.

Training and Testing Environment

Training was conducted in a basement room, approximately the size of a small classroom. This room was located in the experimenter's home. Chairs were arranged in a circle in the middle of the room, but were rapidly abandoned by the subjects. They preferred to sit on the carpeted floor, but still retained the circular configuration. A blackboard was available and used in the classroom. The researcher conducted the classes from a position just outside of the circle, immediately in front of the blackboard. There was a window in the room, located at eye height. The researcher's wife and thesis director were frequently present as observers, and were seated just beyond the edge of the circle of subjects, immediately opposite the blackboard. The atmosphere was relaxed and lively. The experimenter's two cats frequently joined the circle and were the subject of much conversation in the MAL.

All teaching and testing was recorded by means of a tape recorder and a microphone, a Sennheiser MKX 405, located in the middle of the circle on a small tripod. As well, a lapel microphone was worn around the experimenter's neck, a Sony condensor microphone ECM15P. Both microphones were connected to a Nagra 4.2 reel-to-reel recorder, which was located out of sight of the subjects. A new reel was installed at the end of each training period, each of which lasted approximately 50 minutes.

Classes began at 9:00 a.m. and continued to noon, with two ten-minute breaks at 10:00 a.m. and 11:00 a.m. After a one-hour lunch break, training and testing resumed for another 50 minutes. Taking into consideration the age of the participants, large amounts of food, video games, and records were available at breaks. Motivation remained high throughout the experimental week. Activities in class-time were varied to maintain interest and attention. Testing was done as each training unit was completed.

F. Testing

Original intentions were to test each of the six factors after 2 1/2 hours of training, then to take five-minute samples randomly for analysis during the remainder of the training time. However, since all classroom activities and tests were recorded on high quality recording equipment, the experimenter decided to score all subjects on their performance on tests and ongoing class activities from a transcript made later from the recorded tapes. This type of thorough testing allowed the experimenter to investigate the state of learning of any and all variables at a given point throughout the entire week and six months after training was completed.

Four posttests were administered to the subjects at one week, one month, and six months after the teaching week. All variables were tested. The first two posttests, done one week and one month after training, were oral in nature, and both were identical in format and substance. These tests were conducted using pictures which served as a tool for posing specific questions as well as more general questions in which subjects could expand their answers into several connected statements. Questions of the type "What did you do yesterday?" concluded these two oral exams and served as a secondary means of testing knowledge of past tense in Morph.

The third oral posttest, given six months after training, was composed of six relatively complex line drawings i.e., a dog chasing two cats up a tree, or an elderly woman asking a young girl to walk her dog (this request was shown by means of a cartoon-type balloon above the woman). Each variable was tested through variable-specific questions posed for each picture.

The final posttest, a written exam held the day after the third oral posttest, was the longest and most thorough of all exams in the experiment. It tested both production and comprehension. In the first part, a production section, subjects were asked to write plural forms when shown pictures of these objects. Animacy was tested specifically using pictures of referents in either their +animate or -animate states (i.e., a living fish vs. a fish served on a plate). Other variables were tested using translation exercises, paragraph completion tasks, transformations, and written descriptions of pictures.

A comprehension exam followed immediately the written production exam. This final exam tested each variable sequentially by means of fifteen sets of four pictures for each variable, in which subjects were asked to indicate the number of the picture in each set of four which best represented a sentence read by the experimenter. The lexical lists described earlier were available during all posttests; however, subjects did not have access to the rules of Morph which had previously been posted in the classroom.

In order to compare subject performance in the six variables, success in the first three hundred obligatory occasions (this concept is explained below) was scored as a means of determining the initial learning curve for each variable. These results were then used as a metric to assess early success in the learning of an L2, and compared with the overall pattern of learning during the six-month period in which the experiment took place. The first three hundred observations are called the *initial subset* in subsequent discussion.

The experimenter was impressed by the scoring system used by Burt, Dulay & Hernandez (1975) in the Bilingual Syntax Measure. This method, known as structural scoring, was originally developed by Brown (1973) as a means of assessing the proficiency level of L1 learners, and was later widely used in L2 research. Structural scoring uses the concept of the obligatory occasion, in which the output of the language producer is seen as a number of occasions in which a given L2 structure is required in order for his output to be well-formed. For example, in the MAL used in this experiment, the use of any noun or pronoun would oblige the speaker to supply an animacy marker in order for the utterance to be correct.

The researcher adopted the Burt *et al*. method of scoring in which an actual score is divided by an expected score to yield a percentage of accuracy in producing a given structure. For example, each time that a subject produced a sentence containing a noun or pronouns, this was viewed as an obligatory occasion for the use of animacy markers. If a correct form of animacy (*ta* or *po*) was used in the right place, two points were assigned to that subject. If the animacy marker was supplied, but was misformed or misplaced, one point was assigned. If no structure for animacy was attempted, zero points were assigned. The following from

Burt *et al*. resumes the scoring system. The experimenter gave each designation in the Burt *et al*. system a type name (A, B, or C):

TYPE A...2 points...correct structure in the correct place;
TYPE B...1 point....misformed but attempted structure;
TYPE C...0 points...no structure attempted.

In order to give a more accurate idea of the ratio of success as a function of time, structural scoring was computed for each subject in each different type of activity throughout all training and testing tasks. These activity scores, which numbered as many as five or six per class period, were then collapsed to yield average scores for each class period and for each test. This metric is referred to as the *global score* in subsequent discussion. An average of global scores across all nine subjects and all tests and classes yielded a set of numbers which were then graphed to show visually what was occurring within a given variable.

In addition to the use of structural scoring to show success across a variable, the experimenter also computed the percentage of type A, B, and C ratios across all tests and classroom activities.

G. Summary

This chapter has described the variables under investigation, the nature of a concept-formation study and the MAL used in the experiment, and finally the subjects and how they were trained and tested. In summary, in a fourteen-hour training period which followed completion of a concept-formation study, nine subjects, 9 to 15 1/2 years of age, learned a MAL containing six experimental variables. Two variables, one a new semantic intention and the other a new encoding process or form, were located at each of the levels of sentence, noun phrase, and verb phrase. Sentence variables taught and tested were generational marking and SOV word order. Noun phrase variables were noun and pronoun animacy marking and morphologically conditioned suffixing to form plurals. Verb phrase variables were experiential markers and past tense formation by means of infixing with vowel reduplication.

Although it contained many aspects typical of English in order to isolate the experimental variables, the MAL used in the experiment was much closer to being a true L2 than other MALs reported in the literature. It incorporated features of natural language such as semantic fields, gestures, and a foreign lexicon. The MAL, called Morph by teacher and learners, was taught as a means of communication among the subjects and between the subjects and the experimenter.

All teaching and testing activities were recorded by means of two microphones and the transcribed scripts were used to calculate global scores and response types for each variable. Periodic testing continued for six months after completion of the training sessions. Scores were computed for class sessions of approximately 50 minutes each. For each class, ratios were established for individual subjects in each type of activity and for percentage of different response types, and then averaged for each class period.

The questions that the experimenter will answer with the results of these data are:

1. Are certain types of novel and unexpected L2 encoding forms and/or processes and novel and unexpected semantic intentions harder or easier to learn than others? What are the different learning patterns of each variable and group of variables?
2. As a group, are unexpected encoding forms and/or processes harder to learn than unexpected semantic intentions?
3. As a consequence of points (1) and (2) above, what is the relevancy of these findings to the teaching and learning of an L2?

III. RESULTS OF THE EXPERIMENT

Before examining the results of this study, the topics of the practical problems in the experiment concerning the competing goals of the teacher and the researcher, and of how teaching time was allocated to each variable, will be discussed in the first two sections. Since the data-gathering methods used in this experiment are quite complicated, a third section will explain the means by which results were tabulated prior to a discussion of these results, which are reported for the six variables and for individual subjects in the final two sections.

A. Pedagogical vs. Experimental Considerations in the Experiment

During the experimental days, the experimenter assumed two functions: he acted as an impartial analyst and observer of all activities, while at the same time adopting the role of the supportive mentor of a group of subjects trying to learn a language. These two roles do not share the same philosophical point of view. Since the experimenter recognized the different outlooks required for each function, he maintained an almost schizophrenic awareness of the impact of one role on the other throughout the experiment.

The aim of an L2 teacher is to create a favorable atmosphere for learning in which there is a good rapport between learner and teacher in a group environment. This situation was especially applicable in this experiment which took place over a relatively extended period of time. The teacher's perception of his role is that he must be knowledgeable, empathic, and encouraging, while expecting students to put some degree of effort into their learning endeavours. Moreover, the teacher seeks to eradicate error, to achieve a perfect, or near perfect, knowledge of a subject area by using techniques such as individualized instruction, remedials, and other pedagogical approaches which balance student strengths or weaknesses with teaching materials. An effective teacher tries to reduce individual differences and to eliminate problem areas in the learning of a language.

The language experimenter, on the other hand, is interested in achieving a favorable atmosphere for learning, but is more interested in studying the learning process itself. He is not concerned with eradicating error. He is, rather, interested in studying the characteristics of some variable or variables in controlled circumstances in order to formulate a statement which will help to understand better the factors which govern the variable(s) of interest.

In a word, the teacher in this experiment sought to achieve success in an L2, whereas the researcher hoped to explain why and how success had or had not been achieved, while maintaining conditions favorable for experimental purposes. It should be noted in passing that those techniques which were most effective for teaching were not always best for experimental testing. The experimenter attempted, successfully it is felt, to achieve the aims of the teacher, but in ways consistent with the goals of the experimenter.

Some compromises were necessary to assure the best learning conditions in the experiment. These compromises were caused by the length of the experiment and the age of the subjects. Subject fatigue and the need to create a sympathetic ambiance required periodic adjustments in teaching materials, testing times, and overall pedagogical techniques. The rhythm of learning in the first day was slower and more relaxed than in the subsequent four days in order that subjects become comfortable with the learning environment and the teacher. The experimenter soon discovered that the fourth hour of each day required lively activities that engaged the subjects as their attention span dwindled. The experimental schedule made up in advance had to be modified on occasion as a result of human variables and unforseen events, not the least of which was the excitement of three birthdays falling in the teaching week.

One of the major practical problems in dealing with a group of younger learners was that of spending equal amounts of time and performing similar types of activities in each variable. In the course of teaching a variable, if it became obvious to the experimenter that a variable concept had not been clearly grasped, or if subjects seemed slow in developing facility in its use in appropriate contexts (as was the case with Experiential and Generational), he was forced to devote extra time to it. This meant that in the interest of achieving a basic level of competence in each variable, more time was spent in certain activities than in others. This problem will be discussed more fully in the next section.

A second compromise was created by the experimenter's decision to study the experimental variables in real language conditions, rather than *in vitro*. Instead of investigating each variable in isolation from the others and from its behavior in a language, the experimenter chose to embed each variable in a MAL in order to assess the characteristics of the variables when used by L2 learners to communicate their messages. It was decided to introduce the variables sequentially.

The consequence of this decision was that memory and intervariable effects could not be explained as fully as if each variable had undergone precisely the same conditions of teaching and testing. The experimenter felt, however, that losses caused by the introduction of the above effects would be compensated by gains coming from the fact that variables could be tested in an authentic language context.

B. Time Devoted to Each Variable and Group of Variables as a Factor in the Experiment

The question of the amount of time spent in teaching each variable, raised in the first section of this chapter, will be discussed more fully here. The effect of differing amounts of contact time for each variable will be addressed in Chapter 4. The experimenter's initial intention was to spend equal amounts of time in teaching firstly the concept for each variable, and then in developing skills through various types of cued and uncued language activities. As the experiment progressed, it became obvious that this goal was not feasible. As can be seen in Table 3.1 showing how much time was spent in learning each variable and group of variables, not all variables required the same amount of teaching time before they were comprehended and automatized through practice exercises. Generational, for example, was grasped by subjects very rapidly in only sixteen minutes, probably because of the subjects' cultural awareness of generational concepts. However, a considerable amount of practice in language drills was required by subjects before the experimenter judged that they were skilled enough to use this variable correctly in spontaneous communication. SOV, on the other hand, required twice as much time for subjects to learn as a language concept, since it involved metalinguistic notions that some of the learners, in particular the younger ones, found extremely hard to grasp. SOV required much less drilling than most of the other variables before subjects were able to use it correctly in different exercises.

In terms of time spent beyond initial concept introduction time, the experimenter employed four types of language activities in order to develop skills in a variable. Each type or level had progressively less cuing than the preceding one, more emphasis on communication of a message or messages having an ego involvement on the part of the subjects, less time available for monitoring. These four activities were:

1. α-type: one-item manipulations, behavioristic drills, highly cued and teacher-corrected exercises;
2. β-type: sentence creation using pictures or written support, translations from English to Morph and Morph to English;
3. γ-type: sentence creation with no support beyond a verbal context;
4. δ-type: little or no focussing on the form of language by the experimenter, communication activities based on role playing such as skits, charades, and puppets.

If subjects seemed unable to use a variable correctly after about thirty minutes, they received extra practice, particularly in α and β activities. This occurred with Experiential and Generational, which subjects seemed slow in using with any degree of facility even though they had appeared to grasp the concept more quickly than those of the other variables. All variables had equal possiblity for use by subjects in γ and δ activities. There was one exception to this principle: the experimenter intentionally devoted extra time to plural suffix forms, since there were so many of them to be learned.

Secondary time spent in developing skill in a variable, shown in Table 3.1, was the time during which subjects had to use that variable when their attention was focussed elsewhere, usually on practice in some other variable. For example, while doing activities that drilled SOV, subjects were still required to use Animacy, even though their attention was on the ordering of major constituents rather than the elements making up a particular constituent. As might be expected, secondary time turned out to be a function of the point at which a given variable was introduced in the week of teaching. This is the reason why Animacy, the first variable introduced, has a much higher secondary time than Generational, the last variable introduced.

For the purpose of establishing success in a variable within an experimental category, subject performance in the first three hundred compulsory occasions of each variable was determined, thereby yielding a measure of early L2 learning patterns. This initial learning was then compared with subject performance in the same variable over a six-month period, even though not all variables, as explained, had received equal amounts of teaching time. The first three hundred obligatory occasions of each variable

TABLE 3.1 DISTRIBUTION OF TIME (MINS.) SPENT ON EACH VARIABLE AND GROUP OF VARIABLES

DISTRIBUTION OF TIME IN MINUTES FOR EACH VARIABLE

VARIABLE	GRAMMAR PRESENTATION	PRIMARY	SECONDARY
ANIMACY	31.5	29	682.8
PLURAL	25	93.5	436.2
SOV	32	46	392.2
EXPERIENTIAL	20.5	178	177.2
PAST	27	76	166
GENERATIONAL	16	150	28

NOTE 1: PRIMARY TIME IS THE AMOUNT OF TIME SPENT IN DRILLING A VARIABLE. SECONDARY TIME IS THE TIME WHEN A VARIABLE HAD TO BE USED BY SUBJECTS, BUT THEIR ATTENTION WAS CENTRED ON THE USE OF ANOTHER VARIABLE, OR ON COMMUNICATION ACTIVITIES.

DISTRIBUTION OF TIME IN MINUTES FOR EACH GROUP OF VARIABLES

VARIABLE	TOTAL TIME	% TOTAL TIME	GROUP TOTAL
	SEMANTIC INTENTIONS		
ANIMACY	743.3	.87	
EXPERIENTIAL	375.7	.44	
GENERATIONAL	194	.23	
AVER.		.51	1313.0
	ENCODING PROCESSES/FORMS		
PLURAL	554.7	.66	
SOV	470.2	.56	
PAST	269	.32	
AVER.		.51	1293.9

NOTE 1: TOTAL TEACHING TIME FOR THE EXPERIMENT: 852 MINUTES (14 HOURS, 12 MINUTES).

NOTE 2: AVERAGE TOTAL TIME SPENT IN FORMAL TESTING FOR EACH SUBJECT DURING TEACHING WEEK AND FOUR POSTTESTS (NOT INCLUDED IN TOTAL TEACHING TIME): 71.4 MINUTES.

will henceforth be called the *initial subset*. The total number of obligatory occasions in a variable will be referred to as the *overall results* in subsequent discussion. In the case of one variable, Generational, the initial subset and overall results are numerically the same group (see Table 3.2).

Although individual variables received unequal amounts of use time, the two major groupings consisting of Encoding Processes/Forms and Semantic Intentions were equally balanced at about 1300 minutes each (Semantic Intentions= 1313.0 mins; Encoding Processes/Forms= 1293.9 mins). The overall balancing of the two major groups of variables allowed the experimenter to compare the areas of experimental interest, even though there were variations in time spent on each variable within a group. In taking the average within-group percentage contact time for Semantic Intentions and Encoding Processes/Forms, it can be seen that the average of each was about half of the total teaching time spent (.51 for Encoding Processes/Forms and .51 for Semantic Intentions from Table 3.1).

C. Data-gathering Methods

A written transcription of the recording tapes of all teaching, oral testing, and interview activities was prepared by the interviewer during the summer following the experiment. This transcription provided the instrument used to gather the experimental data for analysis.

Transcriptions were grouped for scanning and analysis by day (I-V), four 50-minute blocks corresponding to a traditional class within each of the five days (1-4), and finally by formal oral and written tests where these were given to subjects outside of regular class blocks. This three-part division provided a chronological record of the teaching and testing achievement patterns at any given point. For example, subject results could be calculated for the fourth teaching block of the third day (III,4), or for the separate oral test given at the end of the fifth day (OT,5). Within each of these time-test blocks, subject performance in each variable was analyzed separately (for example, III,3,Animacy; III,3,Plural; etc.) In each variable, performance was calculated for each of the nine subjects for the number of responses provided in each response type (A, B, or C) in each activity level (α, β, γ, or δ). Plurals in each analysis block were further subdivided into the five classes in order to track within-class success.

This somewhat elaborate system of data collection was devised to allow the experimenter to be able to follow the performance in each response group across subjects in each activity type at any given time in the experiment. An example of the data gathering sheet for subjects' performance during the fifth day, second class period, in Animacy (V,2,Animacy) can be seen in Appendix H. This example will clarify somewhat the formatting of this data collection system.

Once the responses were noted into the various categories as just described, two types of statistics were calculated from the data for the initial subset and overall results. These two different procedures will be used to quantify results in the following section.

1. Global score:

Each obligatory context in a variable activity provided a subject with the possiblity of scoring two points. If in a given activity a subject provided three correct responses (A responses), two attempted incorrect responses (B responses), and one nonresponse (C responses), he had the possibility of scoring 12 points (6X2=12). However, he scored two points for each A response (6 points), one for each B response (2 points), and zero points for the one C response. His global score in this case would be the actual number of points scored (6+2=8) divided by the total number of points possible, or 8÷12=.67. The subject's global score in this activity type at this time point in the experiment would be .67.

Global scores were calculated for each individual subject within an activity, then averaged across subjects to show results in the six variables (see

Table 3.5, part A, for these figures). As well, the performance of subjects within teaching blocks and tests was tabulated as global scores, and these results are shown in Figures 3.1 to 3.6 in this chapter. Finally, total A, B, and C responses for subjects in each variable were weighted in the manner explained in the preceding paragraph in order to present success levels attained in the six variables during the initial subset, as well as across the entire teaching week and posttest period. These figures are those of Table 3.3.

The global score is the metric by which the experimenter could determine how proficient subjects had become in the six variables, and ultimately how difficult the variables were relative to each other. In assigning two points to an A response and one point to a B response, the assumption is not that an A response is twice as good as a B response, but rather that in terms of a ranking scale from 0 to 2, an A response is more highly valued than a B response. The global score will establish to what extent subjects were able to remember to use, either correctly or incorrectly, the variable in question. This type of score does not reveal what proportions of A- and B-type responses have gone into making up a final global score; however, this information is available separately as A, B, and C responses (see Table 3.2 for proportions of A, B, and C responses in each variable, and Tables I.1 to I.6 in

Appendix I for individual subjects).

2. Distribution by percentage of responses in each of the the three response groupings (A,B,C):
This second type of calculation was much less complicated than the first. In addition, there was no weighting of numbers required to arrive at a final score. To calculate this figure, student scores were summed for each of the three response categories within an activity, and then across all activities in the time-test block. The totals of each of the three categories were calculated in percentages and noted separately from the global scores.

This section has decribed the means by which data was gathered and analyzed for presentation in the various tables and graphs which follow. The author is aware that the data analysis in this experiment is quite detailed, and hopes that the preceding description as well as Appendix H will facilitate reading of the next section.

D. Results for the Six Variables

Although the scoring system based on three different response categories (A, B, and C) has been previously discussed in Section F, "Testing", in the previous chapter, the assumptions being made about the subject's knowledge of a variable from the three response types will be explained at this point. When a subject's response is totally correct (A-type response), it is assumed that he (a) understands the semantic concept in question, (b) remembers to use it in the appropriate circumstances, and (c) knows and can produce the correct encoding form. If the subject produces a misformed response in an appropriate context (B-type response), (a) and (b) are assumed to hold, but (c) does not, since the correct encoding form has not been produced. If a subject does not respond where a response was called for, we do not know on the basis of one single response what the subject's current state of knowledge of the concept and form are. We can only assume that he has not remembered (b), and has not "produced" the correct encoding form (second part of 'c').

As explained in the previous section, two complementary types of measures were calculated from the data: the global score, which permits a comparison of performance in the MAL between subjects and variables, and a percentage breakdown of the distribution of the three response types in activities and time blocks. These two measures serve as the base for all comparisons, and the author will state in the following pages when one type of comparison is being used rather than the other. Variables are presented in this section in their chronological order of presentation in the experiment. A global discussion of the results for each variable will follow at the end of this section. Tables 3.2 through 3.5, presented sequentially in the following pages, will be referred to frequently in discussing each one of the variables in this section. All of these tables contain both comprehension and production data. Tables 3.10 to 3.17 present T tests showing differences in global scores, A responses, B responses, and C responses between the six variables across all subjects, and because of the problem of inflated probability values---that is, the danger of rejecting the null hypothesis incorrectly when doing repeated T tests on the same data---the α level was set at .01 rather than .05.

1. **ANIMACY: Semantic Intention No. 1**

It will be recalled from the preceding chapter that Animacy refers to a grouping of the nouns in the experimental MAL according to whether they denote living or nonliving referents. This semantic intention is encoded by means of a prenominal particle similar to a determiner consisting of the two forms *ta* ([+animate]) and *po* ([-animate]). As can be seen from Table 3.2, which identifies the number of obligatory contexts and distribution of subject responses for each variable initially and overall, subjects were required to use Animacy more often than the other five variables. Obligatory contexts for Animacy, which numbered 3,150, represent 46% of the total required uses of all variables in the MAL. This proportion appears to be unusually high in relation to those of the other variables. However, Animacy was the first

TABLE 3.2 PROFILE OF ALL SUBJECT RESPONSES FOR EACH VARIABLE DURING THE INITIAL SUBSET (PART A) AND OVERALL RESULTS (PART B) IN ORDER OF PRESENTATION

A. INITIAL SUBSET

RAW SCORES

	A	B	C
ANIMACY	292	4	4
PLURAL	179	108	13
SOV	191	2	107
EXPER	187	28	
PAST	240	19	41
GENER	187	46	60
TOTAL	1276	207	310

PERCENTAGES

	A	B	C
ANIMACY	.97	.015	.015
PLURAL	.60	.36	.04
SOV	.64	0.0	.36
EXPER	.62	.09	.29
PAST	.80	.06	.14
GENER	.64	.16	.20
AVER.	.71	.11	.17

(TABLE 3.2 CONTINUED)

B. OVERALL RESULTS

RAW SCORES

	TOTAL NO. OBLIG. CONTEXTS	A	B	C
ANIMACY	3150	2737	111	302
PLURAL	1414	864	474	76
SOV	576	324	25	227
EXPER	985	395	111	479
PAST	418	296	57	65
GENER	293	187	46	60
TOTAL	6836	4803	824	1209

PERCENTAGES

	TOTAL NO. OBLIG. CONTEXTS	A	B	C
ANIMACY	.46	.86	.04	.10
PLURAL	.21	.61	.34	.05
SOV	.08	.56	.04	.40
EXPER	.14	.40	.11	.49
PAST	.06	.71	.13	.16
GENER	.04	.64	.16	.20
AVER.	.17	.63	.14	.23

NOTE: COLUMNS A, B, AND C IN "PERCENTAGES" SHOW WHAT PERCENTAGE EACH RESPONSE IS OF THE TOTAL NUMBER OF OBLIGATORY CONTEXTS SHOWN FOR THE APPROPRIATE VARIABLE LISTED IN "RAW SCORES".

TABLE 3.3 INITIAL SUBSET AND OVERALL GLOBAL SCORES FOR ALL SUBJECTS AND MEASURES FOR THE SIX VARIABLES IN ORDER OF PRESENTATION IN THE EXPERIMENT

	INITIAL	OVERALL	DIFFERENCE
ANIMACY	.98	.89	.09
PLURAL	.78	.78	0.0
SOV	.64	.58	.06
EXPER	.67	.46	.21
PAST	.83	.77	.07
GENERAT	.71	.72	-.01
VAR. AVER	.70	.77	

TABLE 3.4 AVERAGE CHANGE IN LANGUAGE PERFORMANCE AS A RESULT OF DECREASED SUBJECT MONITORING AND INCREASED EMPHASIS ON COMMUNICATION (RESUME OF TABLE 3.5)

VARIABLE	GLOBAL SCORE	A	B	C
ANIMACY	-.10	-.08	-.02	+.10
PLURAL	-.03*	-.05*	-.02*	+.09*
SOV	-.20	-.19	+.01	+.18
EXPER	-.15	-.15	+.01	+.14
PAST	-.04	-.04	-.03	+.06
GENER	-.16**	-.16**	0.0**	+15**
AVERAGE	-.12	-.11	-.01	.12

* Plural suffixing was not used by subjects in δ activities
**Generational was not used by subjects in γ activities

TABLE 3.5 AVERAGE GLOBAL SCORES (A) AND PERCENTAGE IN DIFFERENT RESPONSE TYPES FOR ACTIVITY AND VARIABLE (B,C,D)

A. AVERAGE GLOBAL SCORE ACROSS ACTIVITIES

	α	β	γ	δ
ANIMACY	.95	.88	.79	.65
PLURAL	.83	.72	.78	-
SOV	.77	.62	.88	.17
EXPER	.77	.51	.45	.32
PAST	.90	.68	.85	.78
GENER	.98	.67	-	.67
AVERAGE	.87	.68	.75	.52

B. AVERAGE PERCENTAGE OF A-TYPE RESPONSES ACROSS ACTIVITIES

	α	β	γ	δ
ANIMACY	.91	.85	.77	.66
PLURAL	.71	.68	.61	-
SOV	.71	.62	.68	.14
EXPER	.75	.47	.36	.31
PAST	.79	.66	.83	.68
GENER	.94	.57	-	.62
AVERAGE	.80	.64	.65	.48

C. AVERAGE PERCENTAGE OF B-TYPE RESPONSES ACROSS ACTIVITIES

	α	β	γ	δ
ANIMACY	.06	.04	.04	.01
PLURAL	.26	.13	.22	-
SOV	.02	.04	0.0	.06
EXPER	.09	.11	.12	.13
PAST	.19	.07	.11	.11
GENER	.06	.21	-	.06
AVERAGE	.11	.10	.10	.07

D. AVERAGE PERCENTAGE OF C-TYPE RESPONSES ACROSS ACTIVITIES

	α	β	γ	δ
ANIMACY	.02	.12	.26	.33
PLURAL	.02	.19	.16	-
SOV	.27	.35	.09	.80
EXPER	.18	.43	.52	.59
PAST	.02	.34	.07	.21
GENER	.03	.22	-	.32
AVERAGE	.09	.28	.22	.45

variable introduced to the subjects, and nouns and pronouns, representing the largest lexical group in the MAL, were all marked for this variable in every sentence position. Consequently, subjects had a longer time in which to use Animacy, and a number of places in each sentence where its use was mandatory.

The profile of subject responses for Animacy is characterized by a high level of success throughout all phases of the experiment. As shown in Table 3.2, correct subject responses Animacy varied considerably by 11% between the two comparison periods (97% initially and 86% overall). Attempted incorrect responses were 1.5% and 4%, and although contexts where an animacy marker was required but none was supplied represented 1.5% of all responses initially, this figure increased to 10% over the six-month period. This difference can be accounted for in the increased δ activities which occurred at the end of the teaching week, and which offered subjects increased contexts where Animacy was not found only in sentence-initial position (see Table 3.6 for a profile of this error type).

It was learned the best of all six variables, as shown by the global scores of .98 and .89 (Table 3.3). As shown in Tables 3.10 to 3.17, which set out the differences between the six variables, all responses categories were significantly better for Animacy than for those of the other variables, with the exception of overall "B" responses (Table 3.16).

Another measure of the success in this variable can be seen in Table 3.4, which sets out the average increase or decrease in both global scores and subject response percentages as a function of decreased monitoring and increased focus on the message (in other words, the experience of students as they moved from α to δ activities). In the case of Animacy, as subjects progressed through the four different activities, there was an average decrease in the global score of 10% between each type. A-type responses decreased at each level on an average of 8%, B responses remained relatively constant at 2%, and C responses increased by 10%. These changes in the global score and percentage of response types were close to the average for all six variables. An inspection of the actual figures in Table 3.5 (parts A to D) showing the reduced success rate of subjects as a function of activity type reveals a steady decline in performance as monitoring and focus on message decreased. However, subjects scored substantially above the variable norm in each of the four activities (part A) and highest of all variables in β activities in Animacy.

An analysis of B and C responses from Table 3.6 below indicates that the two markers for Animacy, *ta* [+animate] and *po* [-animate], were rarely ever misplaced by subjects from the correct position immediately preceding the noun or pronoun modified by an optional adjective. This error occurred in only 2% of B responses, and always involved a reversal of the order of the animacy marker and the adjective. Misformations, which accounted for 15% of all B responses, involved only the vowel in every case. Errors typical of those made were *pa* for *po*, or *tey* or *ti* for *ta*. Subjects who used such vowel replacements tended to use them only for a brief time, after which the correct form dominated.

Although pronunciation pecularities were not of primary interest in this experiment, the experimenter was all the same interested by the effects of English vowel reduction rules on the two animacy markers operating within the NP. In the first two days of the experiment, all subjects pronounced the vowels of the two forms as unreduced vowels, [po] and [tæ] or [tɔ]. As they became more comfortable with these structures, and this was usually marked by increased speed in oral production, the vowels became reduced by nearly every subject to schwa, first *ta*, then *po* in many cases.

The most common type of error made in the B response category involved production of one marker for the other. In 57% of B responses, the [+animate] marker was substituted for the [-animate] marker. The reverse occured in only 26% of B responses. The difference between these two figures is great enough to suggest more than just a chance preference for the [+animate] form and concept. It suggests a saliency of the *ta* form and the [+animate] concept in a ratio of approximately 2:1. One of the findings in the

TABLE 3.6 PROFILE OF B AND C RESPONSES FOR ANIMACY

TYPE-B RESPONSES	PERCENTAGE
1. Misplaced forms	.02
2. Misformations	.15
3. [-animate] for [+animate]	.26
4. [+animate] for [-animate]	.57

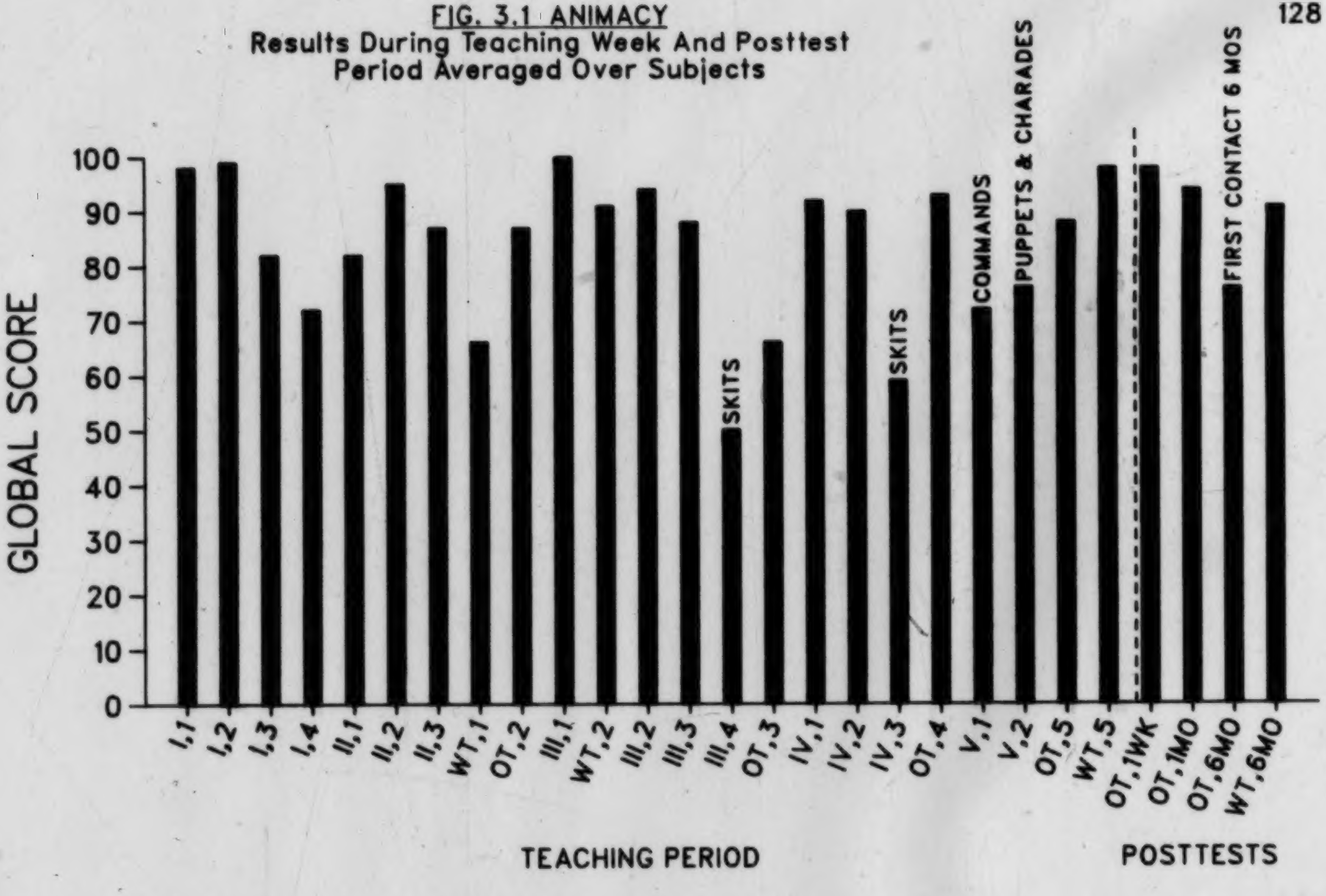
TYPE-C RESPONSES	PERCENTAGE
1. Possession	.01
2. N2 as Subject	.02
3. N Subjects	.16
4. N and PRON in O position	.30
5. Pronouns, all positions	.51

---

concept-formation study reported earlier supports the view that subjects seem to have greater cognitive awareness and ease of conceptualizing of [+animate] entities and groupings than of [-animate] objects. The 26 subjects of the concept-formation study found the [+animate] target concept to be approximately three times easier to form than the [-animate] target group (21.85 trials for the [+animate] target group vs. 71.77 trials for the [-animate]). In fact, many subjects were unable to formulate the [-animate] concept until they had the [+animate] stimulus set sorted separately before them for comparison purposes. Reasons for this greater ease of conceptualization of the [+animate] concept will be discussed in the final chapter.

The percentages of C responses (Table 3.6) show that subjects usually did not mark pronouns for Animacy (.51), as

FIG. 3.1 ANIMACY
Results During Teaching Week And Posttest Period Averaged Over Subjects



well as not marking nouns and pronouns in the object position (.30). The constructions containing nouns and pronouns in the object position were prepositional phrases, direct objects, and indirect objects. Noun subjects were left unmarked for Animacy 16% of the time, and a second noun subject such as "the dog" in "The cat and the dog ran" was nearly always left unmarked by all subjects, even though this type of structure represents only 2% of all B responses. The distribution and nature of C responses suggest the existence of a memory effect in the sequential marking of Animacy in a sentence. The marking of nouns for Animacy was less likely to occur as a function of linear distance from the initial subject position in a sentence. This was not the case for pronouns, however. Pronouns were treated differently from nouns in terms of marking, in that they were nearly always left unmarked in all sentential positions by subjects.

A visual representation of subject performance in Animacy is provided by Figure 3.1. This graph, showing teaching blocks and oral and written tests on the X axis and global scores on the Y axis, illustrates the overall pattern of achievement in this variable. The generally high level of success in monitored activities as well a drop of 30% in average subject success in activities such as charades and puppets can be seen in the graph. Note also that after six months of reduced contact with Morph, subjects had forgotten virtually nothing of Animacy.

This first concept, taught for the greatest amount of time overall, was learned significantly better than the other variables in both sampling periods. It was also retained remarkably well after a six-month period of relative dormancy. However, the two target subgroups of [+animate] and [-animate], which together formed the global concept Animacy, were the hardest of the six subgroups to form as "pure" concepts in the concept-formation study. Moreover, the [+animate] concept was about three times easier to form than the [-animate] concept in the concept-formation study and twice as easy in the main experiment. It would appear that Animacy as a language embedded concept is easier to learn than the same concept when formed independently of language. This issue will be addressed more fully as a point of discussion in the next chapter.

2. PLURAL SUFFIXING: Encoding Process/Form No. 1

As mentioned earlier in the second chapter, both suffixation as an encoding process and Plural as a semantic intention were known to the primary subjects of this experiment. The forms used to mark this known process and known semantic intention were however unknown--in this case, consisting of separate morphologically conditioned plural forms for five arbitrary noun classes, each containing about 15 randomly assigned nouns.

Plural suffixing was introduced early in the second day after subjects were beginning to feel at ease with the learning environment of the experiment. Plurals represent 21% of all obligatory contexts. As in the case of Animacy, the percentage of obligatory contexts is higher than most of the other variables since nouns, the most frequently used part of speech in the MAL, were nearly all subject to pluralization. Although subjects were significantly less successful in learning Plural than in learning Animacy across six months, they were considerably less successful in the initial subset as can be seen in Tables 3.10 and 3.14. In fact, as shown in Table 3.10, the difference between the initial global scores for Animacy and Plural was the greatest of any variables ($p<.001$). The components that contributed to success, as explained below, are different from those of Animacy as well as all of the other variables.

Response patterns were remarkably similar in both sampling periods. The percentages of A responses from Table 3.2 profiling subject responses are .60 initially and .61 overall. But in conjunction with an average level of A responses, subjects provided the highest percentage of B responses for any of the variables. The proportion of attempted incorrect answers was .36 during the initial subset and .34 across the entire experiment. These two figures were highly significant, and were different from those of other variables in the initial subset ($p<.001$) as well as overall (ranging from $p<.05$ to $p<.001$). See Tables

3.12 and 3.16 for these figures. At .04 (initial) and .05 (overall), C responses were, with those of Animacy, significantly the lowest percentages of all variables (see Tables 3.13 and 3.17). Subjects obviously knew when to use plural suffixes, and did so, as one might expect given their knowledge of English plural suffixes. In the process, however, they made a very high rate of error. The reason for this high percentage of error is that Plural had the largest number of separate forms to be learned, and of all the variables, it was the only one which was not predictable or rule-governed.

The progress of this variable across different activity types (Table 3.4) reveals an average variation of only 3% as a result of reduced monitoring across the first three levels (α, β and γ). One of the reasons for this small amount of variation, as noted in Table 3.4, is that subjects avoided using Plural in δ communication activities for reasons to be explained below. As monitoring decreased, although there were few changes in the percentage of attempted wrong answers, there was an increase of C-type nonanswers of 9%.

As might be expected from the subjects' knowledge of their L1, plural suffix forms were never misplaced. Subject errors nearly always involved the inclusion of nouns in the wrong plural class. There was a far greater memory requirement imposed on subjects than in the case of the other variables caused by the need to recall the numerous arbitrary plural forms. In spite of extra practice in working with the different forms, the effects of this memory burden are reflected in the high proportion of type-B responses: one-third of all subject responses were of this nature.

As can be seen in Tables 3.7 and 3.8 which show the degree of success experienced by subjects in learning each different plural suffix category and the extent to which each form was used as a variant for other categories, subjects displayed different levels of success in learning the five suffixing groups. Suffixing categories which were the most similar to English plural forms, namely *s* and *as* (the second of which subjects often tried to reduce in spoken form to [əs]), were learned best at .78 for each group. These two are followed by *en* (.68), which also occurs in a few irregular English plurals such as *children* and *oxen*. The hardest suffixes for subjects were those ending in a vowel, and in particular *u*, [u]. Although there are a few Latin plural suffixes in *a* in English such as *criteria*, as well as singular nouns of foreign origin ending in *a* such as *Samoa*, *sofa*, and *iota* (and all pronounced with a final [ə]), there are few nouns ending in *u* in English. During the teaching period, the two vowel suffixes were added to words such as *catso* 'teacher' (plural *catsou*) and *kapa* 'friend' (plural *kapaa*) which also end in a vowel. The result was distinctly nonEnglish in phonotactic (or word) structure, and some subjects had considerable trouble pronouncing these words.

TABLE 3.7 GLOBAL SCORE FOR RESPONSES IN EACH CATEGORY OF PLURAL SUFFIX AVERAGED ACROSS SUBJECTS AND ACTIVITIES

1. S	.78
2. AS	.78
3. EN	.68
4. A	.67
5. U	.54

TABLE 3.8 DISTRIBUTION OF THE VARIANTS USED BY SUBJECTS IN TYPE-B PLURAL RESPONSES

1. S	.48
2. EN	.21
3. AS	.12
4. A	.08
5. U	.07
6. OTHERS (ens,us,er,an,als,is)	.04

When subjects made an error in using the plural, the suffix which they used as a replacement form was the correct English allophone of *s* nearly one-half of the time (Table 3.8). In fact, in 81% of cases the incorrect form supplied resembled an existing plural suffix in the L1 of the subjects (the sum of the first three variants in Table 3.8). The single vowel suffixes of Morph accounted for only 15% of type-B variants, and the *u* suffix, which was learned the least well of all, was not surprisingly supplied the least number of times as an incorrect variant form.

As concerns type-C responses, a nonresponse for Plural has a different status from a C response in Animacy, in that a noun unmarked for Plural is a singular noun. A C-type Animate response, on the other hand, was always unequivocally an incorrect form. This distinction has relevancy in the case of C responses for Plural, since the majority of subjects' C responses were made in comprehension rather than in production. Since Morph had no concord between noun and verb, the only way that subjects could detect Plural was by means of the noun suffix. Consequently, in oral form the plural suffix was not attended to, and the noun was very often comprehended as being singular.

An interesting characteristic of type-C responses in this variable was the existence of avoidance strategies adopted by most subjects in using plurals in δ-type (communication) activities. Subjects had frequent occasions for using plurals while participating in role playing activities such as charades and puppets, but in all cases they limited their sentence production to singular utterances, even when the use of a plural noun would have seemed to have been more efficient. Subjects revealed in their posttest interviews that they perceived Plural to be one of the hardest variables to learn, because they felt they were making so many errors in its use. It seems reasonable to speculate that rather than venturing into an area that they had not yet mastered, subjects simply avoided plurals completely when there were given a choice. This avoidance strategy had the effect of allowing them to communicate effectively without losing pace because of an uncertain form.

The following command given by one of the subjects to another during a class activity where one subject commanded and the other carried out the command typifies the way subjects preferred long enumerations of singular nouns to a single plural form:

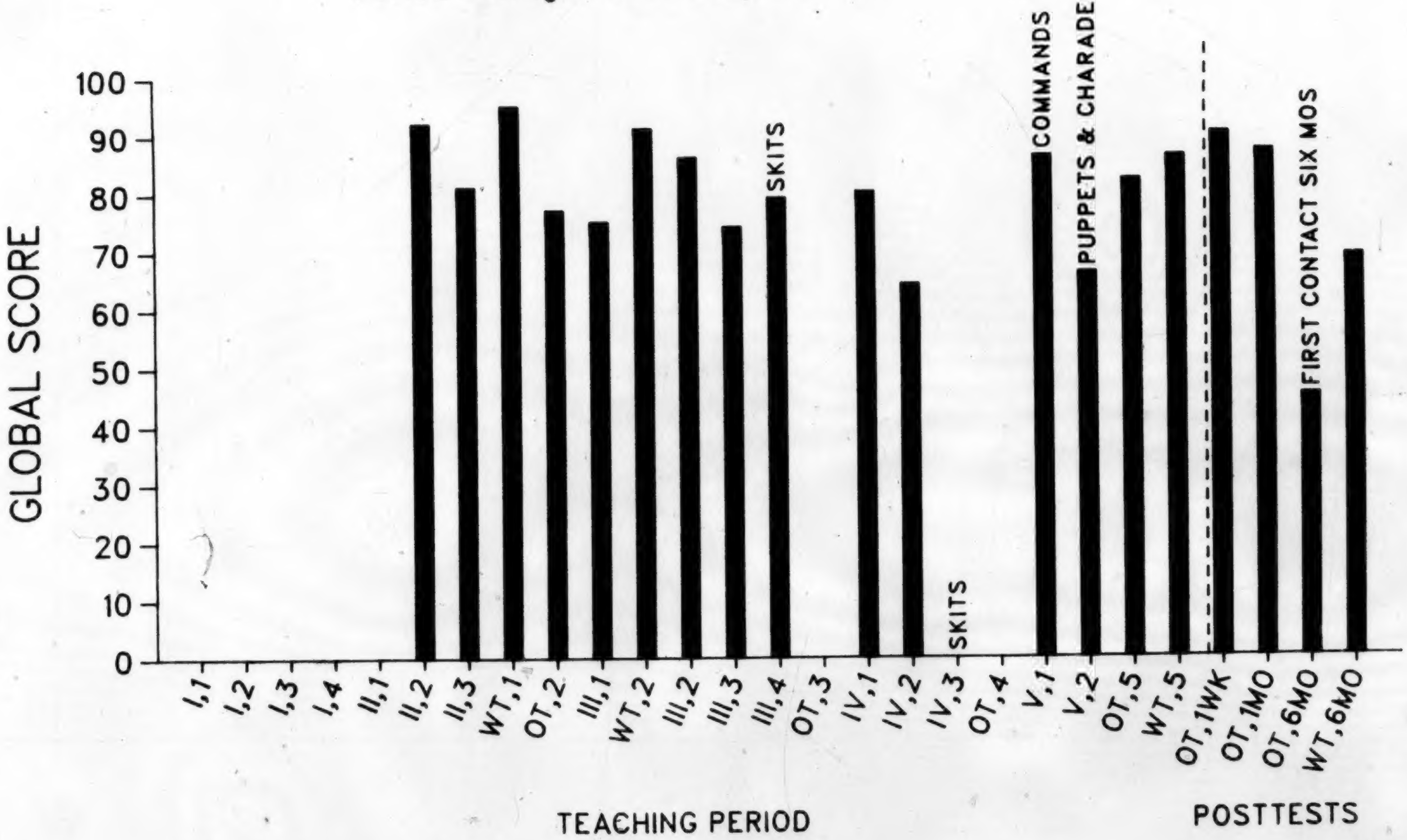
TIME: V,1

L: *Valerie "draw" en ta snirt ou ta langle*
Valerie draw the [+anim] cat and [+anim] dog
ou ta zena ou ta pug boun "minutes"
and [+anim] girl and [+anim] boy two minutes
pat
[gen=young]

L was attempting to assign a task composed of a number of pictures which Valerie was to draw, but chose to list each object separately rather than using a shorter, but more risky, single plural form such as *cats*, (*snirten*) or *dogs* (*langles*).

Figure 3.2 gives a visual representation of performance in this variable. As can be seen in the graph, there was relatively little fluctuation in the global score across time and activity types, although the absence of δ activities tends to suggest a better performance than might otherwise have been the case. Six months after teaching had ended, the performance in this variable had

FIG. 3.2 PLURAL
Results During Teaching Week And Posttest Period Averaged Over Subjects



dropped to about .50, but recovered by .20 after one day.

Plural suffixing forms were taught for the second longest period of time, and were learned the second best of the six variables. As mentioned at the beginning of this section, unlike the other variables, this score hides a large amount of attempted but wrong answers, and only an average amount of completely correct responses. Another interesting aspect of this variable will be discussed in a later section dealing with individual subject results. Those subjects who reported practising plural forms outside of classroom time were those who scored the best results. Conversely, the three weakest subjects in plural suffixes reported that they never practised them.

3. SOV WORD ORDER: Encoding Process/Form No. 2

As previously mentioned, English speakers through their language are familiar with word order as an encoding process, since English uses fixed word order. The Anglophone subjects were unfamiliar with the form of this process, which was SOV in the case of this variable.

Subjects began working on SOV and Plural at about the same time, in the second hour of the second day (II,2). There was less occasion to use this variable than with the previous two variables, as can be seen from Table 3.2 (Part B). Obligatory contexts numbered 576, or 8% of the total. SOV word order occurred only once in each declarative affirmative sentence, whereas Animacy and Plural could occur numerous times within a sentence. Subjects were not required to use SOV in questions and in commands, where English word order held.

Unlike the other variables (with the exception of Experiential overall), subjects performed significantly below average in the global scores (.64 initially and .58 overall), as can be seen in the profile of subject responses and variable scores in Tables 3.2 and 3.3, as well as in T test differences shown in Tables 3.10 and 3.14. A-type responses in both sampling periods were not significantly different from those of other variables. As shown in Tables 3.13 and 3.17, C responses in both sampling periods were significantly different from those of all other variables, except Experiential. SOV shared the figure for lowest percentage of B responses with Animacy at 0% initially and 4% overall.

The profile of ABC responses and the global score reflect the amount of difficulty that most subjects had in learning this variable. During the initial subset, A and C responses were 28% apart, and 16% apart across the whole sampling period, confirming the experimenter's impression during teaching and posttests that subjects in general forgot to use SOV nearly as much as they remembered it. It should be pointed out also that type-C responses for SOV were unlike those of Plural and Animacy, in that failure to impose SOV word order on a sentence meant that the sentence remained SVO, or English word order. There was in effect only a form for C responses, namely SVO, in contrast to all other variables where C responses were null. In the experiment, there were only two variations used in B responses: OSV, and S AUX O V.

An analysis of B responses (see Table 3.9, below) shows that 88% were OSV and 12% involved a clefting of AUX and V in the second order mentioned at the end of the last paragraph. As can be seen in Table 3.4, subjects showed a 20% global score variation between activity levels in SOV, the greatest of any variable. In fact, if one looks at Table 3.5(A), it can be seen that the largest variation, a drop of .71, occured between γ and δ activities. This figure is exceptionally high, and shows that in serious communication activities SOV was nearly completely ignored with a success rate of only 17%, the lowest of any variable. Two strong tendencies were observed in type B and C responses among subjects. Firstly, when subjects used a type-B alternate form they resisted separating subject and verb in creating new sentences. Several subjects maintained the OSV form throughout the experiment. This finding provides more data on the question of subject-verb vs. verb-object bonding, and suggests that in terms of L2 development, the former bonding is stronger for Anglophone learners. Secondly, the younger subjects had the most difficulty with a reorganization of major sentential elements. Conversely, the older subjects within the group had the least difficulty with this

FIG. 3.3 SOV
Results During Teaching Week And Posttest Period Averaged Over Subjects

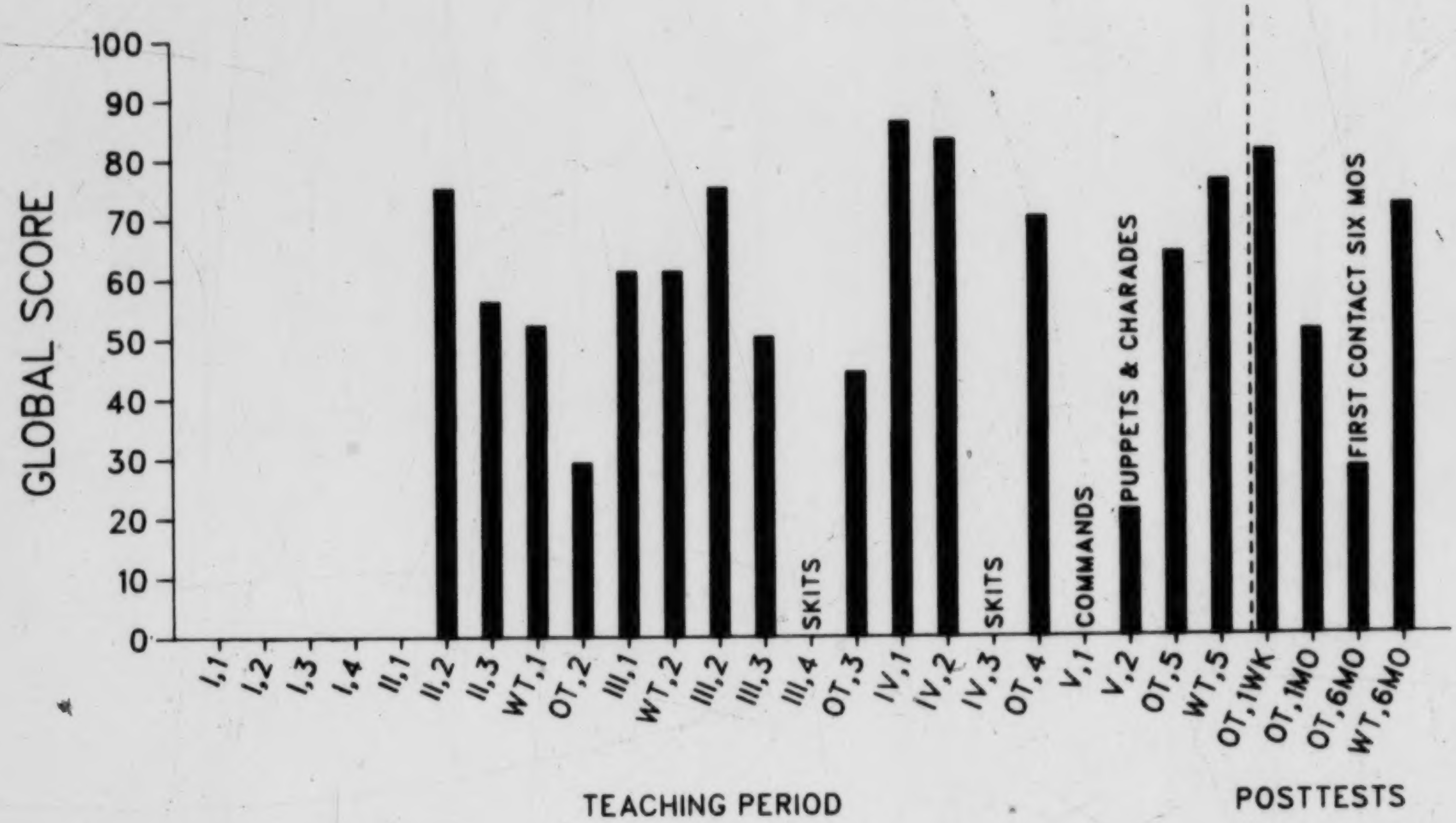


TABLE 3.9 PROFILE OF B RESPONSES FOR SOV, EXPERIENTIAL, PAST, AND GENERATIONAL

A. SOV	
1. OSV	.88
2. S AUX O V	.12
B. EXPERIENTIAL	
1. Misplacement to beginning or end of sentence	.77
2. Confusion of forms	.13
3. Misplacement to locations within sentence	.10
C. PAST	
1. Loss of form after 6 mos.	.55
2. V problems (teaching week)	.20
3. Double pasts, N pasts	.13
4. C problems (teaching week)	.11
D. GENERATIONAL	
1. Confusion with Exper forms	.45
2. Reversal of 2 forms	.35
3. Wrong place	.20

variable. The question of age differences and variable success will be addressed at a later point. An inspection of Figure 3.3, a graph of the average success in SOV reveals wide variations, particularly resulting from communication-centered activities. Of interest in this variable is the low average score of 30% after a six-month rest from the language and the fast recovery time after only one day.

Although this variable had a relatively long period of teaching exposure, the global scores of 64% (initial) and 58% (overall) show that it was one of the hardest for subjects to learn, particularly when focus was on the message. SOV was ignored by subjects about four times in ten. It was also the first variable to show signs of age differences among subjects in terms of its learning patterns.

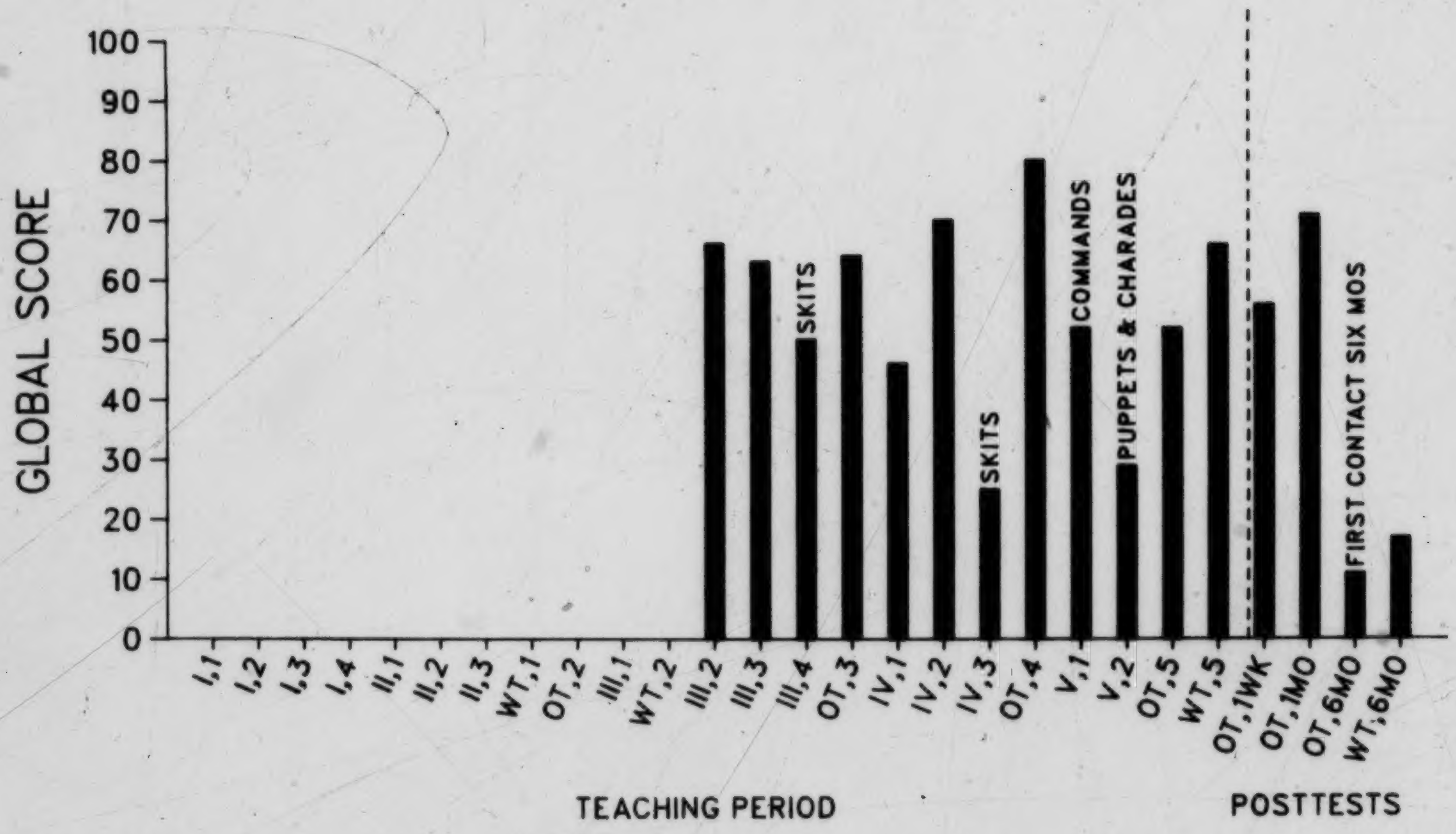
4. EXPERIENTIAL: Semantic Intention No. 2

As explained in the second chapter, Experiential refers to an explicit marking of all sentences in Morph to indicate whether a particular phenomenon is, or has been experienced by the speaker by means of his senses. This semantic intention was encoded by means of an auxiliary verb, which is a familiar encoding process for the subjects. The two forms used were *sha* [+experiential] and *noᶈ* [-experiential].

The experiential concept was the fourth variable to be introduced. Subjects came into contact with it in the second hour of the third day. This variable had the third highest number of obligatory contexts (985), which represents 14% of the total. Since all sentence types in Morph were marked for this variable, subjects had more occasions for using it than SOV, Past, and Generational. This variable was not significantly harder to learn in terms of its global score than the other variables during the initial subset (see Table 3.10). However, it proved to be hardest of all variables for subjects to maintain across the whole six-month period. As shown in the variable results in Table 3.3, scores in Experiential were much better initially (.67) than overall (.46). Global scores across the whole sampling period were significantly different from all other variables (Table 3.14); whereas, global scores during the initial period were not significant, as previously mentioned. Similarly, A responses in the overall period were significantly the lowest of any variable (Table 3.15), but were not significantly different during the initial subset (Table 3.11). During the overall period, subject responses for Experiential resembled most those of the previous variable, SOV. The overall pattern of responses, as in the case of SOV, was one in which subjects supplied no response approximately as many times as they gave a correct response. In the case of Experiential, however, type-C responses were even greater than correct A responses, although this pattern did not occur in the initial subset. Type-C responses were significantly different from similar responses for other variables only across the six-month period ($p<.001$). Overall, C responses were not different from those of Experiential (Table 3.17). In the case of the initial subset, C response differences in Experiential were not significant.

An analysis of B responses (see Table 3.9) reveals some interesting facts about learner errors in this variable: 87% of errors made in using Experiential were errors in placing correctly the two forms. Instead of placing the forms in the AUX position before the verb, subjects who misplaced them either front-shifted to the beginning of the sentence, or

FIG. 3.4 EXPERIENTIAL
Results During Teaching Week And Posttest Period Averaged Over Subjects



placed them in sentence-final position in about equal proportions. Incorrect placing to locations within the sentence accounted for only 10% of B responses. Substitution of one form for the other represented only 13% of B responses.

A C response in Experiential was similar in nature to the corresponding type in Animacy. Failure to mark Experiential did not create a form which could be misinterpreted as being correct, as in the case of Plural, Past, and Generational.

An inspection of subjects' language performance over different activities in Tables 3.4 and 3.5 shows that performance with changing levels of monitoring and focus on message declined rapidly by 15%, although less rapidly than SOV (-.20). As can be seen in Table 3.5, the decline is more or less steady, so that subjects were only scoring 32% on the global score in δ activities. Figure 3.4 shows graphically the abrupt declines which occurred for this variable in communication activities, the almost complete loss of Experiential after six months, and unlike the other variables, the lack of recovery in a final written test administered one day after the initial six-month oral posttest. Experiential was not well learned during the teaching period, nor was it remembered after six months of relative unuse.

This variable was the hardest of all six for subjects to learn over the six-month period. Yet, in the initial subset and concept-formation study, Experiential was easy to learn and to form as a concept. Across the whole experiment, what seems to have been the most difficult aspect of learning Experiential was not development of its concept, but remembering to apply the concept and its form, and if remembered, how to place the two forms in an utterance. The two forms were often treated by the subjects as pre- or postsentential adverbs. The high percentage of C responses across six months shows that subjects forgot to mark Experiential more than the other variables in the excitement of wishing to convey their ideas. This type of forgetting, based on expectations of what should relevantly be expressed in language, is not like that of other variables, as will be shown later.

5. PAST INFIXING: Encoding Process/Form No. 3

Infixing with vowel reduplication (C+reduplicated vowel), as previously discussed, is an unfamiliar encoding process for the Anglophone subjects. This process was used to mark Past, a semantic intention which English speakers normally expect to mark in their language.

Past infixing was introduced in the first hour of the fourth day. The obligatory contexts for Past were 6% of the total. The uses of Past were more restricted than some of the other variables, since they depended on verbs, which were much less frequent than nouns in the MAL, as well as the somewhat artificial use of past tense in communication activities. In spite of a presentation and teaching period which were placed later in the teaching week, the global score in past infixing was high at 83% (initial) and 77% (overall) (see Table 3.3). It was the second best learned variable initially and the third best learned across the entire experimental period.

The Past infixing forms scored a high level of A responses in both sampling periods, but were significantly higher only in the initial subset. As can be seen in Tables 3.12 and 3.16, B responses were not different from those of other variables.

B responses (see Table 3.9) displayed a different type of error in the initial and posttest phases. The largest percentage of production error occurred in the final posttests six months after teaching. After a relative dormancy period of one-half a year, subjects were able to remember only that some part of the verb was repeated. They attempted forward reduplications such as *snesneck* instead of *snemeck* for the verb *sneck*, or backward reduplications such as *stofof* instead of *stomof* for the verb *stof*, occasionally remembering the consonant *m* in producing incorrect forms such as *gatmat* instead of *gamat* for the verb *gat*. This type of B response was a consistent trend among subjects, and represented 55% of error responses.

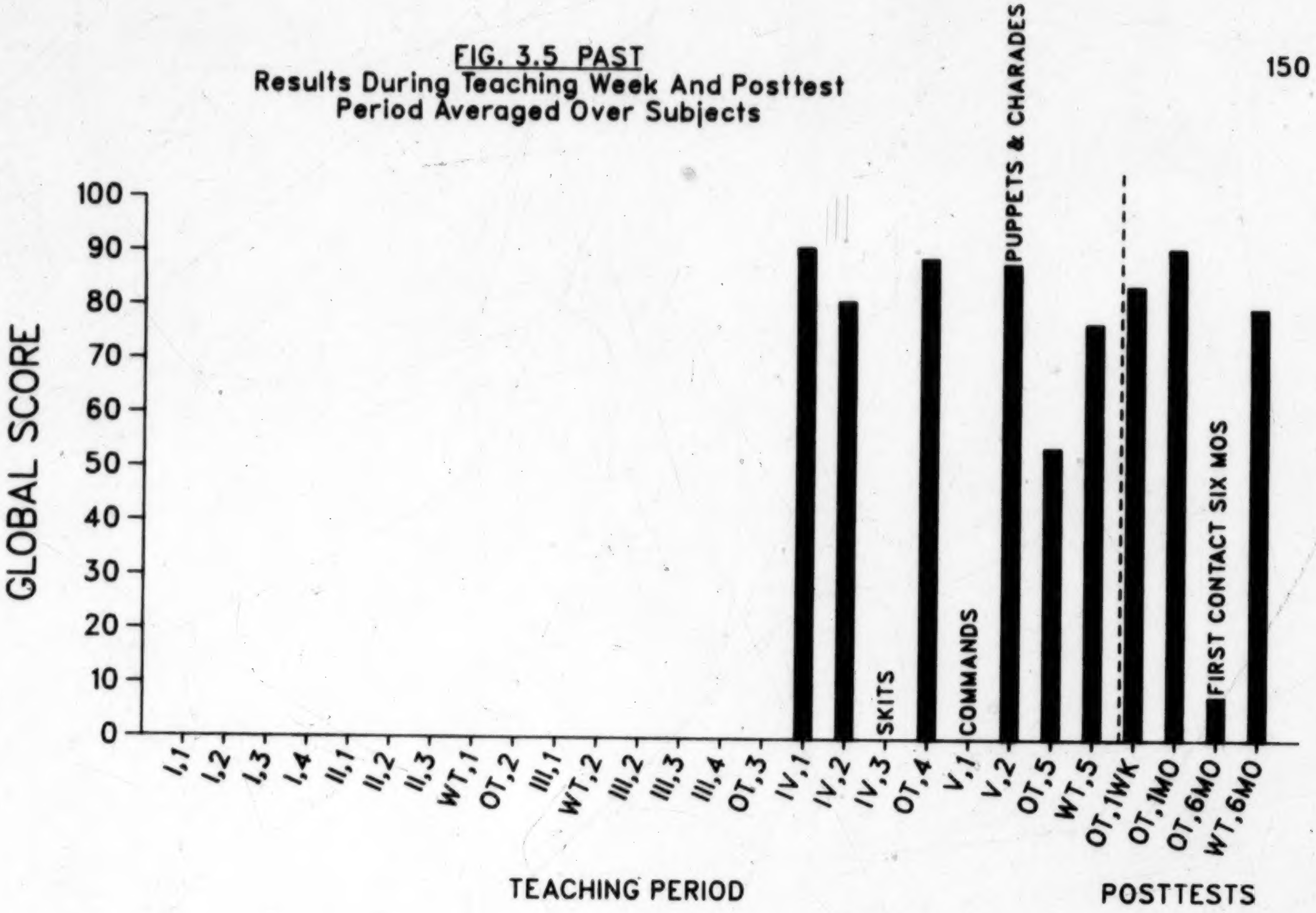
During the teaching period, 20% of wrong answers involved vowel problems (extra or misplaced vowels), 11%

were consonant problems (absence or misplacement of *m*). The last type of B response was a trend on the part of certain subjects to supply double pasts on both AUX and V, or to apply past only to the V, rather than to AUX, where it had to be placed.

Similarly to Plural, a C response could be construed as a correct response since it was also the present tense. Judging these responses relied heavily on the context of each utterance, which was available through the recordings and transcriptions. C responses were not significantly different from those of other variables in the initial subset (Table 3.13). Overall, C responses were signicantly different from all other variables except Generational (Table 3.17). When Past was not used in oral responses, it was very often because the adverb *fleam* 'yesterday' occupied initial position in a sentence, and seemed to be sufficient to convey past notions as in languages such as Chinese. This variable, like Plural, showed much poorer results for comprehension than for production.

There was very little variation in Past as a result of reduced monitoring and increased focus on the message, as can be seen in Tables 3.4 and 3.5. Success in δ activities was only 11% lower than in α activities, where emphasis was on correct form. Subjects appeared to be just as able to use the correct form of Past when required in communication as in substitution drills. In fact, subjects had the most success of all variables with Past in γ and δ activities

FIG. 3.5 PAST
Results During Teaching Week And Posttest Period Averaged Over Subjects



(Table 3.5,B), but made a high percentage of error in structured activities (19% rate of B responses in α activities, as seen in Table 3.5,C). This is in marked contrast with the avoidance behaviour shown in the use of plural suffixes, and the very low degree of success for Experiential and SOV in similar circumstances. Part of the reason for this comes from the fact that the rules for creating past infixing forms were easy to learn and to remember during the teaching week, based on subjects' ability to produce correct past forms. Like plural forms, the past in Morph was used in the same conditions as in English.

An inspection of Figure 3.5, the graph of success across time, shows the high level of success in this Encoding Process. Of interest is the fact that after six months, the subjects' ability to form Past had nearly disappeared. However, after one day the old skills returned to the same high level as six months previously.

6. GENERATIONAL: Semantic Intention No. 3

Generational is a semantic intention marking three differences in generation (older-than-, younger-than-, and same-age-as-speaker) in forms of direct address. Encoding of this variable was by means of a lexical item occupying the same place as English sentence-final adverbs. The three forms used to address interlocuters were *teg* [+old], *pat*

[+young], as well as a zero form indicating that the speaker and addressee were the same age.

This variable was the last of the six variables initially presented to subjects in the second hour of the fourth day (IV,2) in the teaching week. It represented only 4% of obligatory contexts, being confined to only commands and questions which had limited use in the MAL. It was, however, very heavily used in the last two days of teaching, and especially in δ-type activities such as charades and puppets.

Although Generational received the least amount of contact time, subjects learned it fourth best of all variables both initially and overall, as shown by its global scores of .72 (Table 3.3). It should be noted that since Generational was located at the end of the teaching week, the initial subset is also the overall result. The profile of subject responses for Generational across all three response types indicates average responses and no significant differences, except for C responses across the entire sampling period, which were significantly different from those of other variables except Past (see Table 3.17).

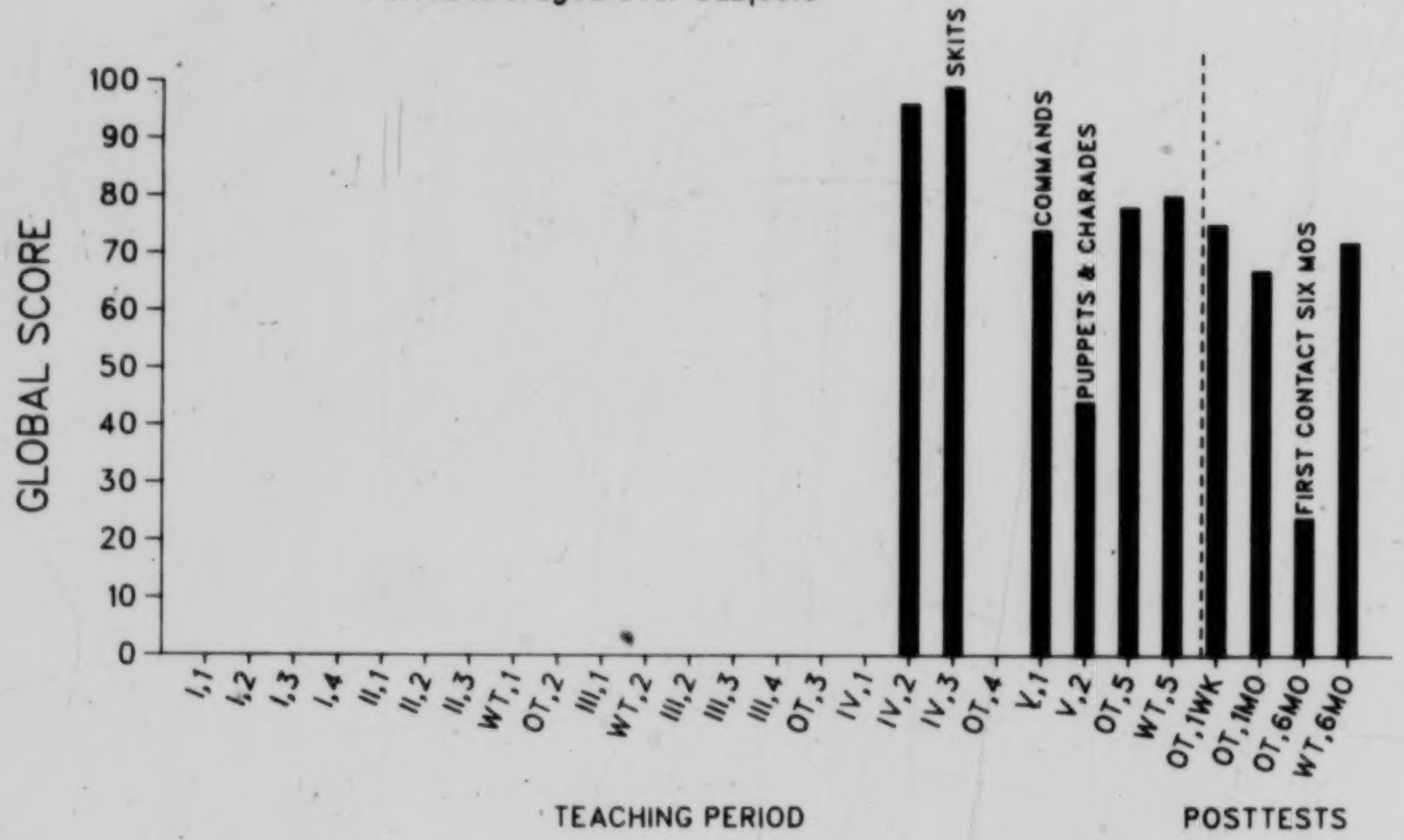
As in the case of Plural, the results across different activities are incomplete, but for different reasons. There are no results for γ activities (sentence creation with no cuing) in the case of Generational. This is because the experimenter was anxious to finish δ activities before the end of the week, after which the subjects would no longer be available for teaching. Consequently, the third level of cuing work for Generational was replaced by extra opportunities for its use in δ activities.

As seen from Table 3.4, the average drop in success across the three activities completed was 16%, the second highest after SOV. The figures from Table 3.5 show that the largest reduction in the success ratio occurred between α and β activities (a drop of 37%). This drop took place in spite of the second highest expenditure of time for primary language activities (Table 3.1). Another factor which could have played a role in this reduction in success is the general compression of time and excitement caused by end-of-week activities.

An analysis of B responses (see Table 3.9) shows that the predominant type of error, accounting for 80% of responses, was error in the form produced to convey Generational. Subjects especially had problems in confusing the Generational forms with *sha* and *nop*, the two Experiential forms. Confusions of this type occurred in 45% of B responses. A reversal of the two forms for Generational occurred 35% of the time. The remaining 20% of B responses were errors of place.

C Responses again posed a unique problem, in that a nonresponse was also potentially a right response. Since absence of *pat* and *teg* could also be interpreted as an intention to mark generational equality, this required a greal deal of care on the part of the experimenter to verify

FIG. 3.6 GENERATIONAL
Results During Teaching Week And Posttest
Period Averaged Over Subjects



that subjects were not merely forgetting to add the Generational marker. The average increase in C responses as a result of decreased monitoring and increased focus on the message was 15%, 3% above the average.

An inspection of the graphic representation of success in this variable in Figure 3.6 shows an abrupt decline in success in δ activities, an extensive decay over six months, and a relatively good recovery rate ih the written test done one day after the six-month oral test. An interesting feature of success in this variable is the sex difference noticeable between males and females to be discussed later in individual subject differences. The two males in the experiment scored the lowest of all nine subjects in this variable, whereas females of all ages did quite well in Generational. This difference is suggestive of another set of cultural differences, this time operative between male and female language learners.

As a concept to be formed in the concept-formation study, Generational was easier than Animacy. This position was not maintained in the final results of the main experiment. The reasons why subjects were less successful with Generational than with Animacy in Morph are less clear than for Experiential, where memory and syntactic placement seemed to account for reduced success.

TABLE 3.10 T TESTS (INDEPENDENT SAMPLES) SHOWING DIFFERENCES IN GLOBAL SCORES BETWEEN THE SIX VARIABLES ACROSS ALL SUBJECTS IN THE INITIAL SUBSET

	ANIM	PLUR	SOV	EXP	PAST	GEN
ANIM		7.48***	7.45***	4.92***	5.02***	6.33***
PLUR			2.77**	1.65	-1.35	1.46
SOV				-.39	-3.63**	-1.16
EXP					-2.35*	-.54
PAST						2.41*
GEN						

NOTE: 28DF, *p<.05=2.048; **p<.01=2.763; ***p<.001=3.674

TABLE 3.11 T TESTS (INDEPENDENT SAMPLES) SHOWING DIFFERENCES IN "A" RESPONSES BETWEEN THE SIX VARIABLES ACROSS ALL SUBJECTS IN THE INITIAL SUBSET

	ANIM	PLUR	SOV	EXP	PAST	GEN
ANIM		9.64***	7.30***	5.60***	5.98***	6.75***
PLUR			-.70	-.28	-4.47***	-.49
SOV				.27	-3.16**	.15
EXP					-2.70*	-.13
PAST						3.07**
GEN						

9

NOTE: 28DF, *$p<.05=2.048$; **$p<.01= 2.763$; ***$p<.001=3.674$

TABLE 3.12 T TESTS (INDEPENDENT SAMPLES) SHOWING DIFFERENCES IN "B" RESPONSES BETWEEN THE SIX VARIABLES ACROSS ALL SUBJECTS IN THE INITIAL SUBSET

	ANIM	PLUR	SOV	EXP	PAST	GEN
ANIM		-10.73***	0.0	-3.39**	-3.03**	-5.07***
PLUR			10.68***	6.86***	8.43***	4.63***
SOV				-3.37**	-2.98**	-5.04***
EXP					1.09	-1.90
PAST						-3.05**
GEN						

NOTE: 28DF, **p*<.05=2.048; ***p*<.01=2.763; ****p*<.001=3.674

TABLE 3.13 T TESTS (INDEPENDENT SAMPLES) SHOWING DIFFERENCES IN "C" RESPONSES BETWEEN THE SIX VARIABLES ACROSS ALL SUBJECTS IN THE INITIAL SUBSET

	ANIM	PLUR	SOV	EXP	PAST	GEN
ANIM		-1.26	-7.57***	-4.08***	-3.87***	-5.03***
PLUR			-6.47***	-3.52**	-2.64*	-3.91***
SOV				1.01	4.01***	2.56*
EXP					1.94	.93
PAST						-1.41
GEN						

NOTE: 28DF, *$p<.05=2.048$; **$p<.01=2.763$; ***$p<.001=3.674$

TABLE 3.14 T TESTS (CORRELATED SAMPLES) SHOWING DIFFERENCES IN OVERALL GLOBAL SCORES BETWEEN THE SIX VARIABLES ACROSS ALL SUBJECTS

	ANIM	PLUR	SOV	EXP	PAST	GEN
ANIM		9.58**	4.40**	19.46***	3.97**	4.06**
PLUR			2.55*	15.40***	-.14	1.50
SOV				2.36*	-2.81*	-1.57
EXP					-8.75***	-5.65***
PAST						1.23
GEN						

NOTE: 8DF, $^{*}\underline{p} < .05 = 2.306$; $^{**}\underline{p} < .01 = 3.355$; $^{***}\underline{p} < .001 = 5.041$

TABLE 3.15 T TESTS (CORRELATED SAMPLES) SHOWING DIFFERENCES IN OVERALL "A" RESPONSES BETWEEN THE SIX VARIABLES

ACROSS ALL SUBJECTS

	ANIM	PLUR	SOV	EXP	PAST	GEN
ANIM		17.25***	4.04**	13.43***	4.07**	3.26*
PLUR			.47	6.46***	-2.25	-.51
SOV				2.8*	-2.08	-.67
EXP					-5.99**	-3.39**
PAST						.90
GEN						

NOTE: 8DF, *p<.05=2.306; **p<.01=3.355; ***p<.001=5.041

TABLE 3.18 T TESTS (CORRELATED SAMPLES) SHOWING DIFFERENCES IN OVERALL "B" RESPONSES BETWEEN THE SIX VARIABLES

ACROSS ALL SUBJECTS

	ANIM	PLUR	SOV	EXP	PAST	GEN
ANIM		-18.79***	-.44	-2.11	-3.14*	-1.95
PLUR			13.01***	4.79**	5.85***	3.16*
SOV				-2.15	-4.92**	-1.87
EXP					-.37	-.58
PAST						-.28
GEN						

NOTE: 8DF, *p<.05=2.306; **p<.01=3.355; ***p<.001=5.041

TABLE 3.17 T TESTS (CORRELATED SAMPLES) SHOWING DIFFERENCES IN OVERALL "C" RESPONSES BETWEEN THE SIX VARIABLES

ACROSS ALL SUBJECTS

	ANIM	PLUR	SOV	EXP	PAST	GEN
ANIM		3.24*	-4.67**	-14.89***	-3.05*	-6.18***
PLUR			-4.79**	-13.91***	-4.71**	-8.3***
SOV				-1.7	3.38**	3.06*
EXP					9.96***	7.54***
PAST						-1.68
GEN						

NOTE: 8DF, $^{*}p<.05=2.306$; $^{**}p<.01=3.355$; $^{***}p<.001=5.041$

7. SUMMARY OF VARIABLE RESULTS

This section will summarize briefly the results for each variable described more fully in the preceding pages. The most important parameters used for judging the success which subjects experienced in learning a given variable are shown in the first four columns containing numbers next to the variable names in Table 3.18. These columns show respectively the rankings of the six variables in global scores, and the three types of subject response in each obligatory context. Rankings for B and C responses are shown inversely, in that "1" in these columns shows the lowest percentage of attempted incorrect responses (B responses) as well as the lowest amount of nonresponses (C responses). In columns 2 to 5 (global score results, A, B, and C responses), the first figure shows results in the initial subset. The second figure, coming after a slash, is that of the overall six-month period. For example, column 2 ("Global Results") indicates that subjects were ranked third ("3") in the initial subset, but second ("2") overall in Plural. Where a figure is common to both samples, it is shown only once rather than twice, separated by a slash.

The rankings of five additional parameters have been added in this table for the purpose of providing an extra dimension to the interpretation of the final results. These parameters are:

1. Global scores in δ (communication) activities (column 5);

2. Reduction in overall global scores across the four classroom activities, also ranked in inverse order (column 6);
3. Perceived order of ease by subjects of the variables in a posttest interview (column 7);
4. Average results across all activities in an oral test given six months after the teaching period (column 8);
5. Recovery rate in the variables as shown in a written test administered one day after the six-month oral test (column 9).

Animacy was the best learned of the six variables, and showed the highest percentage of correct A responses, the second lowest amount of attempted incorrect B responses initially, as well as the lowest overall level of B responses. C responses were the lowest and second lowest percentages initially and overall. It was judged to be the easiest variable to learn by the subjects, and was retained the best of any variable in two tests after a six-month absence from active sustained use. Although this variable was clearly the easiest to learn, there are two areas where other variables were easier. When involved in meaningful communication activities, subjects were less able to use Animacy successfully than Past and Generational. Subjects also experienced a greater average decrease in success across activity types than for Plural and Past. The most common error in using Animacy was a use of the [+animate] form for the [-animate] form (.57 of B responses were of

TABLE 3.18 RANKINGS OF A NUMBER OF PARAMETERS SHOWING LEARNING SUCCESS IN THE SIX VARIABLES

VARIABLES	GLOBAL RESULTS	A RESPONSES	B RESPONSES	C RESONSPES	DELTA ACTIVITIES	SUCCESS REDUCT ACROSS ACTIVITIES	SUBJECTS' PERCEIVED ORDER EASE	ORAL TEST AFTER SIX MONTHS	WRIT. TEST DAY AFTER
ANIMACY	1	1	2/1	1/2	3	3	1	1	1
PLURAL	3/2	5/4	6	2/1	-	1	6	2	5
PAST	2/3	2	3/4	3	1	2	2	6	2
GENER	4	4/3	5	4	2	5	3	4	3
SOV	6/5	3/5	1/2	6/5	5	6	5	3	4
EXPER	5/6	4/6	4/3	5/6	4	4	4	5	6

NOTE 1: "1" represents the highest level of success, "6" indicates the lowest level of success.

NOTE 2: Columns 2-5 contain both initial (before slash) and overall results (after slash).

this sort). In sentence positions other than the subject, Animacy tended to have a high level of C response (.30), and pronouns were seldom ever marked (.51).

Plural was learned initially third best of the six variables, and second best overall. Subjects provided less than average amounts of correct responses (fifth place initially and fourth place overall), the highest amount of attempted incorrect responses, and the second lowest and lowest percentage of unattempted responses in the initial and overall samples. Subjects considered this variable to be the hardest of the six to learn. It was retained second best after six months. Of the five plural forms, the English-like plural suffixes were learned best, and the "s" plural suffix was used the most frequently of all variants in B responses (.48). Subjects avoided the use of Morph plural suffixes in δ activities. Plural had the least reduction in success as a result of decreased monitoring, although an avoidance strategy in communication activities may have rendered this advantage somewhat suspect. The subjects in the experiment gave the highest percentage of C response for Plural in comprehension exercises.

Past was learned second best initially and third best overall. It showed the second highest figures for correct A responses, third and fourth highest for B responses initially and overall respectively, and third highest for C responses. This variable was judged by subjects to be the second easiest to learn after Animacy. Although Past was a "mid" variable in terms of standing in the final rankings, it was the variable that subjects retained the least well after a six-month period of relative dormancy. However, the day after the six-month oral test, subjects appeared to rediscover the rules for past infixing. In the last written test, Past recovered to second position among the six variables. Past was the most successfully used of all variables in δ activities, and success in this variable was little affected by a reduction in teacher cuing and student monitoring. The most common error in using Past was to apply reduplication in an incorrect fashion.

The generational concept was learned fourth best in both sampling periods by the learners of Morph. Correct use of Generational (A responses) was fourth highest among the variables initially, and third highest overall. In both periods, B responses were in fifth place and C responses ranked in fourth place. This variable was judged to be the third easiest to learn by the subjects. After six months, Generational occupied the same fourth place that it occupied at the end of the teaching period. However, it recovered to third place in the written test on the following day. Subjects scored second best in communication activities in Generational, but experienced a large drop in success across activity types. Only SOV showed a larger decrease in this area. The most common error in the use of Generational was a confusion with the two forms used for Experiential (.45) and a reversal of the two Generational forms (.35).

SOV is ranked at sixth and final place initially and at fifth place overall. It exhibited a very different learning pattern initially and overall. Subjects showed the third highest level of correct A responses initially, but this level dropped to fifth place over the entire experiment. C responses were very high throughout the experimental period at sixth place initially, and fifth place overall. It is not obvious why subjects would have made so few incorrect attempted responses: in any event, SOV ranks first and second initially and overall in this category. This variable is once again fifth in terms of successful use by subjects in δ activities, and it was viewed to be the fifth hardest variable to learn by the subjects. One interesting result of the testing of variables after six months was that this variable was better learned under the effects of the passage of time than the other variables. This was the only variable to show an improvement in results after a layover of one-half a year. The most common error in using SOV was a front-shifting of O into OSV constructions (.88).

One of the hardest variables for subjects to learn in the experiment was Experiential (fifth hardest initially, and hardest overall). Initially, correct responses placed this variable in fourth place, but overall, subjects had the least success of all variables in providing correct responses. Their answers put Experiential in fifth place initially and sixth place in contexts where the variable was required, but not supplied. Subjects made the fourth highest percentage of errors (B responses) initially, and the third highest overall in the experiment. In communication activities, Experiential was the fourth hardest variable to use correctly, and it showed the fourth highest reduction in success across activity types. After a six-month interval, subjects found this variable to be fifth hardest, and after one day, it had become the variable in which they were the least successful. Although learner success was lowest in Experiential, the subjects ranked it as the fourth hardest to learn. The most common error in this variable was incorrect placement of the forms in a Morph sentence (.87).

In comparing the results between the initial and overall samples, a number of differences become obvious from the data (Table 3.3). In general, variables were as well, or better learned in the initial subset than in the overall results. Subjects learned Plural with the same degree of success initially as overall (.78). In every other case (with the exception of Generational, which can not figure into this comparison), success levels ranged from 6% to 21% above levels in the same variable over a longer period of time. Experiential is an extreme case of a variable where early success was not maintained over six months; in fact, the subjects of the experiment were about one-third less successful overall than in the initial subset.

As well, two sets of variables showed instability in the two sampling periods. Plural and Past, the second and third variables, as well as SOV and Experiential, the fifth

TABLE 3.19 SIGNIFICANT DIFFERENCES BETWEEN LEARNING OF VARIABLES IN INITIAL AND OVERALL SAMPLES

	INITIAL	OVERALL
1. GLOBAL	Animacy(high) Past(high)	Animacy(high) SOV(low) Experiential(low)
2. A RESPONSES	Animacy(high) Past(high)	Animacy(high) Experiential(low)
3. B RESPONSES	Plural(high) Past(low) Animacy(low) SOV(low)	Plural(high) Past(low)
4. C RESPONSES	Animacy(low) Plural(low) SOV(high)	Animacy(low) Plural(low) SOV(high) Experiential(high) PAST(low)

and sixth variables (Table 3.18), showed variability in success patterns across time. Past, the Encoding Process which was second best learned initially, moves to third place in long-term maintenance. Conversely, Plural, the Encoding Process which was third best learned initially, is second best maintained overall.

A similar instability between fifth and final place in terms of learning success is found for SOV and Experiential. Experiential, the Semantic Intention which was learned fifth best initially, moves to final position overall. SOV, in final position initially, becomes fifth overall.

The most striking aspect of this comparison, as shown in the T tests (Tables 3.10 to 3.17) is the early (relative) success in the learning of Experiential, whereas this variable, overall, is the worst learned. Other important significant differences between the two sampling periods are the high initial level of global and A responses for Past, the low overall global level for SOV, the initial low levels of B responses for Animacy and SOV, and finally, the low levels of C responses for Past and Experiential overall. These points are summarized in Table 3.19.

A number of interesting findings emerged in addition to the scores and percentages providing the results for the variables. These are listed below, and will be discussed in more detail at a later point.

1. The saliency of [+animate] forms in B responses for Animacy;
2. The importance of practice for success in Plural and the existence of an avoidance strategy in communication;
3. The inability of subjects to retain the rule and the ability to form Past over time;
4. Sex differences among the subject results for Generational;
5. The effects of time and age in learning SOV;
6. The role of cultural expectation in the failure to learn Experiential.
7. The difference in subjects' behaviour in the concept-formation study from their use of the same concepts embedded in language. A comparison of Animacy and Generational, which used the same concept-formation task shows that Animacy, which was by far the harder of two concepts to form, turned out to be the best learned

variable in the main experiment. Generational was an easier concept to form, but harder to use when embedded in language. Experiential, which was an easy concept to form due to the simple and obvious presentation in the concept-formation task was found extremely difficult in the main experiment. The following chapter will look at some of the possible reasons for these differences.

E. Individual Subject Results

The nine subjects in the experiment were motivated, bright, and outgoing pre-adolescents and adolescents, who were known personally by the experimenter. All subjects worked hard to please him, and from a motivational point of view, they were untypical of a group of individuals selected randomly for an experiment. The very high levels of ego involvement throughout the experiment may have served to reduce the extremes in individual variation that might otherwise be found in a group of subjects.

In the overall group of nine subjects of which the average age was 11 years, 11 months, there were four distinct age levels across a 6 1/2 year age span. The four levels, each separated by two years, parallelled the school experience of each age group:

1. The nine-year-old group (Elementary School): one subject, CH, the youngest learner of the group;
2. The 11-year-old group (early Junior High School): four subjects, MA, L, J, and ST. Ages in this group ranged

from 10 years old for the youngest, to 12 years, 4 months for the oldest;

3. The 13-year-old group (late Junior High School): three subjects, V, R, and SH. Ages in this group ranged from 12 years, 8 months to 13 years;
4. The 15-year-old group (Senior High School): one subject, MU, who was 15 1/2 years old.

This group of subjects is interesting from an age point of view, in that there were nearly as many preadolescent as adolescent L2 learners. There were, unfortunately, not enough males to support statistically any generalizations about sex distinctions, although such distinctions were present in this particular group. As might be expected, the individual subjects within an age level showed many differences throughout the experiment. There were, nevertheless, a certain number of commonalities within some groups. These will be mentioned at the end of the section.

Individual results are presented below in Tables 3.20, 3.21, 3.22, 3.23, and in the tables of Appendix I. The overall final global scores by variable for each subject ordered from youngest to oldest appear in Table 3.20, and again in Table 3.21. Table 3.21, however, shows the individual differences from the group mean in each variable. In this table, differences of ±.10 to ±.19 are indicated by a single asterisk, differences of ±.20 to ±.39 with two asterisks. Differences of 0.0 to ±.09 are not specially marked in the table. Table 3.23 sets out the individual results for each of the primary subjects in the concept-formation study reported earlier, and compares them with averages of both the primary group and the larger group of 26 subjects in the concept-formation study. Tables I.8 to I.11 in Appendix I compare subjects across the six variables, and indicate that throughout the experiment subject behaviour was congruent on the experimental tasks. There were no significant differences between subject performances in any of the response categories (global scores, A, B, or C responses).

Table 3.22, where subjects are also ordered by age, is a summary of the global results of the various language-related factors mentioned in the L2 literature as having predictive powers. Although these factors have been briefly discussed in Chapter 2 (Section D), a few words of explanation will be helpful in interpreting some of the contents of the table.

1. PLAB (Pimsleur Language Aptitude Battery) stanine scores in column 4:

   This is a normalized standard score expressed as a nine-point scale. Each stanine is an equally spaced unit used to express a student's standing in comparison with other students in the same school grade population. To interpret these stanines, Pimsleur proposes a three-part broad classification of below-average performance (stanines 1, 2, and 3), average performance (stanines 4, 5, and 6), and above-average to superior performance (stanines 7, 8, and 9).

2. Subtest 3 of PLAB (Vocabulary) in column 5:
This subtest comprised 24 items testing word knowledge in English. Subjects were given a word such as *chastised*, and asked to indicate its "meaning" from four possiblities: (a) coaxed, (b) chosen, (c) chivalrous, and (d) punished. In this subtest and the following one, the higher the figure shown, the greater a subject's L2 aptitude is expected to be.
3. Subtest 4 of PLAB (Language Analysis) in column 6:
Subjects were given in writing a few sentences in a "foreign" language, and then asked to create new utterances in this language. This could only be done if subjects understood the principal of SOV word order, and suffixing which marked DO and NEG attachment to verbs.
4. EFT (Embedded Figures Test) in column 11:
This is a measure of the relative field dependence or independence of an L2 learner, as gauged by the subject's ability to discriminate a simple geometric figure embedded in a complex shape. The subject's score is the average time in seconds taken to discern a series of hidden shapes in 24 patterns. The target "simple" figure is not in view when subjects are asked to find it when embedded in other shapes. The figures shown in this column are normalized for age and sex. Plus figures show the degree of field independence, minus figures are indicative of field dependence.

5. Hidden Figures Test CF-1 and CF-2, columns 12 and 13: These two tests are similar to the preceding EFT. In CF-1, one of five simple geometric shapes must be found in a complex figure. The main difference between EFT and CF-1 is that all five shapes, constantly available for subject reference, can be candidates for the target shape embedded in the complex form. In CF-2, there is one simple figure, constantly present before the subject. The subject has to indicate only whether the simple figure is present or not in the complex one. He is not asked to show the simple figure to the examiner. The memory difference between EFT and the two Hidden Figures tests may explain the different results. Since norm tables are not available for this factor, the results are given in raw scores. The score for CF-1 is the total number of shapes discerned by a subject in 24 minutes. The score for CF-2 is the total number of figures in which the single target shape was identified as present or absent in different complex shapes during six minutes.
6. Integrative motivation and French language-class Anxiety, columns 14 and 15:
These two factors were tested in the Gliksman *et al.* questionnaire. All items in the questionnaire allowed for seven gradations of response from -3 to +3. There were four items devoted to integrative motivation on the model of the following questionnaire item:

"Studying French can be important for me because it will allow me to meet and converse with more and varied people".

Five items tested French class anxiety. This example taken from the questionnaire exemplifies the nature of these items:

"It embarrasses me to volunteer answers in our French class".

In the case of Anxiety, a negative number indicates a lack of anxiety, whereas for Integrative motivation, a negative number demonstrates a non-integrative point of view in a subject relative to French.

In the following section, the performance of each subject in the six variables will be summarized relative to the learner attributes that appear in Table 3.22, and the results from the concept-formation study in Table 3.23. A brief section looking at the individual within each age subgroup will follow this. Subjects will be described from youngest to oldest, the ordering used in Tables 3.20 through 3.23.

1. Nine-year-old group:

CH, the youngest subject in the experiment, was the only member in this group. She liked reading at home,

TABLE 3.20 INDIVIDUAL RESULTS FOR SUBJECTS IN THE SIX VARIABLES (OVERALL GLOBAL SCORES)

SUBJECT	ANIM	PLUR	SOV	EXPER	PAST	GENER	AVER
CH	.89	.78	.22	.36	.87	.67	.63
L	.86	.73	.63	.43	.70	.65	.67
MA	.90	.85	.59	.52	.74	.81	.74
J	.88	.71	.81	.45	.78	.69	.72
ST	.92	.79	.53	.46	.74	.53	.66
SH	.91	.80	.77	.50	.84	.85	.78
R	.82	.70	.48	.28	.77	.82	.65
V	.89	.82	.43	.52	.66	.82	.69
MU	.92	.81	.88	.60	.93	.63	.80
AVER	.89	.78	.57	.46	.77	.72	.70

TABLE 3.21 INDIVIDUAL VARIATIONS FROM OVERALL GLOBAL SCORE AVERAGES ACROSS VARIABLES

SUBJECT	ANIM	PLUR	SOV	EXPER	PAST	GENER
CH	0.0	0.0	-.37**	-.10*	+.10*	-.05
L	-.03	-.05	+.04	-.03	-.07	-.07
MA	+.01	+.07	0.0	+.06	-.03	+.09
J	-.01	-.07	+.22**	-.01	+.01	-.03
ST	+.03	+.01	-.06	0.0	-.03	-.19*
SH	+.02	+.02	+.18*	+.04	+.07	+.13*
R	-.07	-.08	-.11*	-.18*	0.0	+.10*
V	0.0	+.04	-.16*	+.06	-.11*	+.10*
MU	+.03	+.03	+.29**	+.14*	+.16*	-.09

TABLE 3.22 INDIVIDUAL RESULTS IN A NUMBER OF FACTORS RELATED TO L2 LEARNING

	FINAL			ST#3	ST#4	CURR	YRS	CURR			HID	HID		
	GROUP		PLAB	PLAB	PLAB	SCHOOL	FORMAL	GRADE			FIG	FIG		
SUBJECT	RANKING	AGE	STANINE	VOCAB	L.ANAL	AVER	FRENCH	FRENCH	ENG	EFT	CF-1	CF-2	INTEG	ANXIETY
CH	9	9	6	6	2	77	2	60	80	+103.02	11	167	-1.25	+0.20
L	7	10	5	10	2	65	3	75	80	+84.27	7.5	171	-0.25	-1.2
MA	3	10,6	8	12	10	75	3	90	80	+96.15	20	156	+3.0	-0.8
J	4	10,8	8	14	5	75	3	75	80	+97.82	11	177	+0.75	-0.20
ST	6	12.4	6	17	7	67	4	40	76	+25.64	23	255	+0.75	+2.40
SH	2	12,8	5	13	5	62	4	64	72	+81.39	12.5	241	+0.75	-0.60
R	8	13	3	8	3	57	1	-	65	+39.61	5.5	185	0.0	0.0
V	5	13	3	9	3	54	5	47	68	-3.18	6.5	182	-1.00	+2.40
MU	1	15,6	5	15	12	75	5	78	83	+26.55	22	211	+0.25	-2.40
AVER		11.11		11.6	5.4	67	3.3	66	76	+61.25	13.2	193.9	+0.25	-0.02

TABLE 3.23. COMPARISON OF RESULTS FOR INDIVIDUAL PRIMARY SUBJECTS WITH AVERAGE PRIMARY GROUP AND TOTAL GROUP RESULTS IN CONCEPT-FORMATION STUDY

	TARGET CONCEPT GROUPS					
SUBJECT	[+ANIM]	[-ANIM]	GEN=OLD	GEN=YNG	[+EXP]	[-EXP]
CH	51		6		7	
L		104		1		6
MA		18		1		14
J	32		4		-	
ST	7		6		10	
SH		66		6		5
R	105		22			1
V	1		14		5	
MU	3			1		4
A.AVER. PRIM. SUBJ.	33.17	62.67	10.40	2.25	7.33	6.00
B.AVER TOTAL POPUL.	21.85	71.77	9.38	2.31	4.17	4.23
B-A	-11.35	+9.10	-1.02	+0.06	-3.16	-1.77
%DIFF.	-0.52	+0.13	-0.11	+0.03	-0.76	-0.42

and carried over her preference for the visual mode into her strategies used for learning the MAL. CH transcribed nearly everything possible into written form during the teaching week. She reported using her copious notes as a way of remembering and studying for the next day. As can be seen in Table 3.22, CH had normal language aptitude as measured by the PLAB, and the highest score above the norm of all subjects in EFT, although her scores in CF-1 and CF-2 were not especially high. CH's school grade average was high (77%), and she excelled in English (80%) and Math and Science (not reported in Table 3.22, but also in the 80% range). She was particularly interested in computers. Classroom French was CH's weakest subject, and the unpleasant experiences which she related to the experimenter about her French teacher explain perhaps her low integrative motivation in French (-1.25) and French classroom anxiety (+.20).

As shown in the final overall group ranking (column 2, Table 3.22), CH ranked last among the nine subject in the experiment, with a final score of 63%, 7% below the group average. Her scores in Animacy, Plural, and Generational were close to the group average. Her performance in Past was 10% above average. In the case of SOV, however, she was 37% below the norm, and 10% below for Experiential (Table 3.21). CH never used SOV in unmonitored γ or δ activities, and in fact used it only when her attention was selectively focussed, as in cued α and β exercises. With Generational, CH scored only 22% in δ activities. At the time of the experiment, CH was interested in learning Hindiba, a secret language used by the other children in the area. She was aware that something in Past had vague similarities with Hindiba, which might explain her above-average performance in this variable.

In terms of forming the three semantic concepts in the concept-formation study (Table 3.23), CH scored close to the average for the Generational=old and +Experiential target groups. She did, however, require 54% more trials than the other primary subjects to form the +Animacy concept. This poor performance in forming this concept did not appear to affect negatively CH's overall performance in the variable, since her final score was only 2% less than the average subject score (Table 3.21).

In the experiment CH had extreme problems with the syntactic placement of Generational and Experiential, as well as with the displacement of major syntactic components which occurred with SOV. Subtest 4 of PLAB, which posed a similar problem in the use of SOV, was highly predictive of CH's inability to place correctly new forms in an L2. In Subtest 4, CH made the same low score as the second youngest subject in the experiment. In Experiential, in which CH was the second lowest scorer, her problem was not in failing to understanding the concept. It was rather in correctly placing the two forms. These results suggest that CH had more problems with these two variables because of a less developed metalinguistic awareness of language than was the case for most of the older subjects, although this might be questioned because of the difficulty which all subjects encountered with Experiential.

2. 11-year-old group:

There were four subjects in this group: L, the youngest at ten years; MA at 10,6; J at 10,8; and finally ST at 12,4. L was a sister of the youngest subject, CH, described earlier. Like CH, L was an avid reader, since both came from a family which stressed this skill. L also preferred to write as much as possible, probably for memory purposes. L had normal aptitude for L2 learning (stanine 5), a tendency toward field independence, average school grades (65%), and good grades in school French in spite of some anxiety caused by her past French language experiences.

L was the seventh best learner of the variables in the MAL, with a final score of 65%. On the six variables, she was average in Animacy and SOV (a low score in Subtest 4 of PLAB was not predictive of poor performance in SOV in this case), and somewhat low in Past (-.07). L's performance in Plural (-.05) and Generational (-.07) was slightly below the group average.

An analysis of L's overall performance in Generational revealed some interesting facts. L did relatively well with Generational during testing week (75%), but lost the concept almost immediately after teaching had ended. Six months after the teaching period, it was as though she had never heard of this concept. Virtually the same thing occurred with Experiential, although some of the other subjects also lost this latter concept after six months. In the case of Plural, L's below average performance came from a lack of practice of the various forms. The experimenter learned this from a posttest interview with L at the conclusion of the experiment.

An inspection of the results of the concept-formation results for L (Table 3.23) show that she had considerable difficulty in forming -Animate, although she had no problems with Generational=young and -Experiential. L required 66% more trials than the average score of the other primary subjects for Animacy, although this poorer performance in the concept did not affect her ability to learn the concept when it was embedded in a language. Her final score in Animacy was only 2% less than the average. As previously mentioned, L experienced her greatest difficulties in Morph in remembering over a period of time concepts which had already been formed and developed through language use.

MA was the next youngest in this group. Also a serious reader, MA was much less dependent on writing than the two preceding subjects. MA can best be described as a competitive achiever who worked hard during and after class in order to perfect her knowledge in the MAL. Her grades in school were high (75%), and she excelled in school French (90%), which perhaps explains her very high integrative motivational score of +3.0. MA scored the highest of all subjects in the PLAB, and the highest in Subtest 4 of PLAB, an indication of her superior ability in analyzing language.

This subject ranked third highest among the subjects in terms of overall performance. She was average or above average on all variables. In the six variables MA did best on Generational and Plural; in fact she scored the highest of all subjects in this latter variable. The reason for this was not difficult to find, since MA could be seen each day after the teaching period practising her plurals forms.

As can be seen in Table 3.23 showing the results for this subject in the concept-formation study, MA was able to form the -Animate concept in 75% less trials than the average number of trials for the other primary subjects. Results for the other two target groups were near the norm; however, MA's performance in forming the -Animate target group suggests that this subject possessed an above average ability to deal with abstract concepts.

J was the next youngest subject in the second group. This subject had some exposure to foreign languages, at least in terms of foreign-language sounds, having lived as a child with her parents in Malaysia for 18 months. This contact with other languages may have stimulated a general interest in other languages, a fact which she reported in her posttest interviews. J had the second highest L2 aptitude of the group, above-average grades in French and other school subjects, and a strong tendency toward field independence.

In the overall ranking of the subjects of the experiment, J stood in fourth place. As can be seen in Table 3.21, this subject was close to the average in all but two variables: Plural (-.07) and SOV (+.22). For Plural, J reported that she never ever practised them, and counted on her memory to come up with the correct form. In the case of SOV, in which she scored the second highest of all subjects, J reported in posttest interviews that she found this feature of the MAL to be "neat", and that it appealed to her. J manifested considerable nervousness in formal testing conditions in the MAL, in spite of a reported absence of anxiety in studying French in school. Of all of the subjects, J was the most bothered by the intrusion of French into her pronunciation of Morph, a fact that she commented on frequently during and after the experiment.

In the concept-formation study, J was unable to form the concept +Experiential, even after repeated trials. The failure to develop this concept in the earlier study did not prevent her from scoring 6% above the average in the variable when it was embedded in language.

ST was the last subject in this group. He was the only other subject to have had a sustained contact with another language as a child, in this case Cree. ST was reported by his parents to have a high IQ, somewhere in the 170 range. His parents were unhappy that this advanced IQ had not produced better scholastic results, and attributed this to a lack of challenge in the local school curriculum. ST also had a strong tendency toward field independence, having scored the highest raw score in the EFT of all subjects, as well as the highest in both Hidden Figures Tests. ST's analytical abilities did not seem to help him much in his school grades, as mentioned. His school grades were average (67%), and French, in which his current grade was 40%, was a subject that he found unpleasant. The negative experiences in French caused a high level of anxiety while in French classes (+2.40), but had surprisingly little effect on ST's integrative motivation (+0.75). ST had average aptitude as measured by the PLAB, although he made the highest score on Subtest 3 measuring knowledge of English vocabulary equivalences.

In the concept-formation study (Table 3.23), ST was able to form the concept +Animate and Generational=old in one-third and two-thirds respectively the average number of trials required for the group of primary subjects. His performance on Generational in Morph was conversely 19% below the norm, and performance in Animacy was average. On the third concept, +Experiential, ST required 144% more trials than the average. As well, he made an average score in this variable in Morph.

As shown in Table 3.20, ST ranked sixth among the nine subjects in his mastery of the six variables. His final global score of 66% was 4% below the group average. However, as can be seen in Table 3.21, his performance across the six variables was very close to the average of the other subjects, with one notable exception. ST did very poorly in Generational, in which his score was 19% below all of the others except MU, the other male subject in the experiment. As concerns the profile of the response types for this variable, ST gave the lowest percentage at all subjects of A responses (.30), the highest percentage of B responses (.45), and the second highest percentage of C responses (.25) (see Tables I.1 to I.3 in Appendix I). There was no particular pattern to the types of errors made in the B responses. As concerns Generational, ST either forgot to mark it, or couldn't remember how to mark it in 70% of cases. It is the experimenter's belief that this failure to mark Generational was produced by a cultural insensitivity to questions concerning age distinctions, which interestingly enough the other male subject also shared.

3. 13-year-old group:

The next group was composed of three female subjects, SH, R, and V, whose ages ranged from 12,8 to 13 years. SH, the youngest of this group, was the most confident and spontaneous of the group of subjects. She scored a stanine 5 in the PLAB, suggesting an average L2 aptitude. Her scores in the EFT and both Hidden Figures Tests indicate a field independent personality. SH's overall grades, as well as her French grades were average, both being in the low 60s. This subject was not anxious in her French classes (-0.60), and had an integrative position with regard to the French language.

SH scored second highest across all variables, and her final global score average of 78% was 7% above the group average (see Table 3.20), and 2% behind the best subject. Her scores across the six variables were slightly above average for Animacy, Plural, Experiential, and Past. However, SH was 13% above the norm for Generational, and 18% above the norm in SOV, the third highest of all subjects in this variable. Although this subject scored highly on the vocabulary part of PLAB (Subtest 3), her score on the language analysis section (Subtest 4) was average. Once again, the section of PLAB that should have been the most predictive of success with SOV failed to be so.

SH formed the three concepts of the concept-formation study in an average number of trials, although she required more trials to form Generational=young than other primary subjects. Ironically, she was the best of the nine subjects in this variable in the main experiment.

The second subject in this group, R, showed unmistakable signs of anxiety throughout the experiment. This anxiety was caused in part by the excitement of an upcoming marriage in her family, and also by the fear of being left behind by the others in the group (reported to the experimenter in a posttest interview). The two observers of the experiment, the experimenter's wife and thesis supervisor also noted this subject's anxiety and nervousness. Although R was an anxious L2 learner, the items concerned with this factor in the Gliksman *et al.* instrument failed to confirm this trait in the context of a French class. R reported that she was neither anxious nor at ease in her French classes (0.0).

As concerns the other language-related factors, R had low L2 aptitude (stanine 3 on the PLAB), and a low score on Subtest 4, the section dealing with "foreign" language analysis. R was moderately field independent, although somewhat less than most of the other subjects. Her school grades were the second lowest of the group (57%). This subject had the least experience in the study of an L2, having studied French for only one year in grade 3, and no other L2 since.

R had the second least success of all subjects in learning the six variables in the experiment. Her final global score was 65%, 2% better than the score of the youngest subject, CH, and 5% below the group average. She was below average in all variables except Past (0.0) and Generational (+.10). R was 8% below average in Plural, 11% below average in SOV, and 18% below average in Experiential. Her score in Experiential was the lowest of the group. An analysis of the different types of responses for this subject (Appendix I) shows that she had the least success of all subjects in overall Experiential type-A responses (.24) and the highest level of type-C responses (.68). For Plural, R had the highest percentage of B responses of all subjects (.45).

R's results from the concept-formation study suggest some problems in forming two of the three concepts. She required 380% more trials than the norm to form +Animate, and 126% more trials to form

Generational=old. Although R was the least successful of all subjects in learning the variable Experiential, she was the fastest of all subjects to form the concept -Experiential in the concept-formation study.

V was the last subject in the 13-year-old group. This subject was the only one to spontaneously try to use Morph as a means of communicating messages between herself and the experimenter in class. She was also the most interesting hypothesis tester in the group as she systematically tried to come to grips with SOV, the variable with which she had the most problems in the experiment.

As can be seen in Table 3.22, V had low L2 aptitude (stanine 3 on the PLAB). This subject shared the lowest aptitude score with R, the preceding subject described. V's average grade in school was 54%, and her French average was 47%, even though she had spent the most years of all subjects except MU in studying this subject. She had low integrative motivation (-1.00), and high French classroom anxiety (+2.40), resulting no doubt from low grades in French. V was the only subject to be identified as field dependent in the EFT, a figure confirmed by CF-1, but not by CF-2.

V scored fifth highest of the subjects in learning the six variables. She was average in Animacy, slightly above average in Plural, and 6% above average in

Experiential. Past was below average (-.11), and SOV was 16% below the group average. This subject, with CH and R, had poorly developed metalinguistic notions, which seemed to influence the ability to accomodate a variable such as SOV requiring a knowledge of how languages operate syntactically. For example, V was the only subject to try to put nouns into the past tense in the MAL. In the concept-formation study, V was the only subject to form +Animate after only one trial (Table 3.23). Her performance on the other two concepts was average.

4. 15-year-old group: There was one male subject in this last group, MU. As can be seen in Table 3.22, MU had average aptitude, although he made the highest scores of all subjects in Subtests 3 and 4 of the PLAB. He was field independent, had above average grades in school (75%), and was a successful student in French (78%). As well, MU was relaxed in his French classes (-2.40) and had adopted an integrative attitude relative to French. With V, MU was the subject who had the most experience with French as an L2.

This subject was the most successful of all subjects in learning the six variables. His final global score was 80%, 10% above the average score. He was above average in five of the six variables: 29% above in SOV, 16% in Past, 14% in Experiential, 3% in Plural, and 3%

in Animacy. MU was low in only one variable: Generational. Interestingly enough, the other male subject, ST, was also low in this variable. As suggested earlier, this may be the result of a culturally acquired insensitivity on the part of males to questions of generational differences in society, and the need to recognize them in language.

MU's above average score in SOV may be in part due to his prior experience with SOV word order in French declarative sentences containing pronouns. It will be recalled from Section B, Chapter 2, that this subject was the only one of the nine subjects to be aware that pronoun objects in French use SOV word order.

MU was a superior concept former on all three concepts in the concept-formation study. He required less than 50% of the average number of trials to form +Animate and Generational=young, and an average number of trials for -Experiential.

In summarizing the results of the preceding section dealing with individual differences within four age subgroups, the following generalizations based on the data from this experiment can be made:

1. The youngest subject, and two subjects in the 13-year-old group had the most problems with the syntactic ordering of major sentential constituents. The

youngest subject also had problems with the syntactic placement of the two markers used for Generational.

2. The highest scores for aptitude were found in the 11-year-old group.
3. The female subjects in the 13-year-old group in all three cases made the highest scores in Generational. Although the experimenter was not able to find a test of empathy for the subjects, he subjectively catagorized the subjects in this group as more empathic than the other subjects. It is hypothesized that the females of this age group were much more sensitive to age and generational distinctions in society, and to their manifestations in language. This group had the least aptitude for learning an L2, and included the only field dependent learner.
4. The oldest subject in the experiment was the best learner of the six variables, whereas the youngest learner was the least successful.
5. The males were the poorest learners of Generational. The two male subjects were substantially below the average of the female subjects in this variable. As with no. 3 above, the experimenter hypothesizes that there are definite sex distinctions that can be found in the learning patterns of an L2 which come from the cultural experiences of the learner.
6. The ability of the primary subjects to form a concept in the concept-formation study was not predictive of the

results for these same subjects when they learned these concepts in a language. In general, primary subjects required a greater number of trials to form the six target groups investigated in the concept-formation study than the total population of which they were also a part. This is not surprising, however, since the primary subjects were drawn from the lower end of the three age groups tested. It will be recalled from the results of the concept-formation study reported in the last chapter that it was the older subjects who were the best concept formers.

The implications of the results which have been presented in this chapter will be discussed in the next chapter.

IV. DISCUSSION AND CONCLUSION

A. The Hypotheses

This chapter will assess the initial hypotheses in light of the experimental results, and will conclude with some speculations--psycholinguistic and pedagogical--about the findings of the study.

Restatement of the Problem

As stated in the initial chapter of this thesis, linguistic theories such as Contrastive Analysis and Error Analysis have failed to address the question of language behaviour in the individual and the manner in which an L2 is developed by the learner. In both of these models, one finds a theory of language based on an a priori linguistic analysis of the language product which then becomes the basis used to make pronouncements on various cognitive processes operative in the L2 learner. This approach adopted by modern L2 theorists has bypassed an important question, namely, that of identifying the different language tasks and how they are mastered. If a learner is to proceed intelligently to the development of an L2, the tasks leading to success must be defined and investigated through the type of research undertaken in this study. The state of L2 learning is presently at the stage where the various tasks still remain poorly delineated and investigated.

The working premise of this thesis is that language is composed of a semantic base and a code alphabet comprising linguistic processes and encoding forms. An individual wishing to learn a new L2 must comprehend the new semantic intentions existing in the target language, understand the new encoding processes, and finally memorize and automatize the new encoding forms. It is assumed that the L2 learner, in developing the new semantic base and code alphabet will rely on his expectations of what language should be. These expectations, based on knowledge of his L1 and past cultural experiences, will guide him as he explores and learns an L2.

The importance of defining and investigating the role of the two task variables in L2 development prompted the experimenter to carry out the experiment described in the previous pages. Three hypotheses were formulated and an experiment was designed and conducted in order to test these hypotheses, which are restated and discussed in the following section.

Hypothesis No. 1

Unexpected encoding processes and unexpected semantic intentions encountered by the learner in an L2 can be shown to play a role in predicting learner success.

In this experiment, the only variables systematically investigated were the two task variable categories. Other variables were not the object of experimentation, in fact, the MAL was kept as "English" as possible in order to minimize the effects of other contaminating variables. Nonetheless, the experimental results show clearly that the nine primary subjects experienced different levels of success, both individually and collectively in the learning of the six variables. Average learner success in the variables ranged in the initial subset from a low of 64% in SOV to a high of 98% for Animacy, and overall, from a low of 46% in Experiential to a high of 89% for Animacy. Since there was considerable variability in the learning of different types of variables in different sampling periods, it has been demonstrated in this experiment that unexpected encoding processes and semantic intentions in an L2 do play a role in predicting learner success. What has not been demonstrated by this study is the amount of variability attributable to the six variables relative to factors such as the learning of an L2 phonology. This question is obviously of interest; however, on the basis of the experiment reported in these pages, it is possible only to claim that the null hypothesis is rejected, and that the magnitude of the overall effect of the variables remains to be established.

Hypothesis No. 2

Encoding processes/forms will show different patterns of learning than semantic intentions

Relevant comparisons between the two variable groups are presented in Table 4.1, showing a number of similarities and differences between the two experiment groups in both sampling periods. The most important comparisons are the categories "global score", and percentages of "A", "B", and "C" responses shown in the first four columns of the table. These four comparisons reflect how successful subjects were in mastering each of the two experimental categories throughout all phases of learning and testing, and what the response profile was for each of the two main groups.

During the initial subset in the two experimental groups, as shown by the global score in Part A of Table 4.1, subjects had greater average success in learning Semantic Intentions (.79) than in learning Encoding Processes/Forms (.75). Over the entire experiment, however, subjects experienced a slightly higher success rate in the encoding processes/forms category (.71) than in the semantic intentions group (.69), as can be seen in Part B of this table. Both initially and overall, there was no significant difference between the two experimental categories in global scores. As concerns A-type responses in both sampling periods, more correct answers were supplied in the semantic intentions group initially than for Encoding Processes (.74

TABLE 4.1 COMPARISON OF RESULTS FOR THE TWO EXPERIMENTAL GROUPS, SEMANTIC INTENTIONS AND ENCODING PROCESSES/FORMS

A. INITIAL SUBSET

GROUP	INIT GLOB SCORE	% A RESP	% B RESP	% C RESP	DIFFER LOW HIGH VAR
SEMANT INTENT	.79	.74	.09	.17	.31
ENCODE PROC FORMS	.75	.68	.14	.18	.19
DIFFER	.04	.06	.05	.01	.12

B. OVERALL RESULTS

GROUP	GLOB SCORE	% A RESP	% B RESP	% C RESP	DIFFER LOW HIGH VAR	DIFFER ACTIV TYPES	OT 6MOS	WT 6MOS
SEMANT INTENT	.69	.63	.10	.27	.43	.14	.37	.60
ENCODE PROC FORMS	.71	.63	.17	.20	.20	.09	.27	.74
DIFFER	.02	.00	.07	.07	.23	.05	.10	.14

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vs. .68). Overall, A responses were lower than in the initial subset, both variable groups scoring at .63. Important between-group differences can be seen to exist in the percentage of B responses (attempted but incorrect) and C responses (where subjects did not supply any form at all) across the two sample periods. Both initially and overall, the encoding processes/forms group exceeded the semantic intentions group in the amount of attempted incorrect responses (.14 initially and .17 overall for Encoding Processes, and .09 initially and .10 overall for the semantic intentions group). This was primarily because of a very high rate of error experienced in learning the many new encoding forms of Plural, as was explained earlier in Section D of Chapter 3. Initially, there was very little difference between the two experimental groups in the percentage of C responses. As shown in Table 4.1, Encoding Processes/Forms were slightly higher than Semantic Intentions (.18 vs. .17). Over the entire experiment, however, the percentage of C responses for Semantic Intentions increased by .10 to .27; whereas, similar overall responses in the encoding processes/forms group increased by only .02 to .20. This difference may be explained by the nature of the two experimental groups. Subjects expected to mark variables such as Plural and Past, which exist in their L1. Conversely, their language expectations would lead them less strongly to want to mark new and unexpected semantic intentions. None of the differences in A, B, and C responses between the two experimental groups was significant.

If one adds the average percentage of A and B responses together, it can be seen that initially, subjects remembered to mark Semantic Intentions and Encoding Processes/Forms equally well (Semtantic Intentions .74 + .09=.83; Encoding Processes/Forms .68 + .14= .82). Overall, however, subjects remembered to mark the encoding processes/forms category on an average 80% of the time (.63 + .17), whereas they remembered to mark Semantic Intentions 73% of the time (.63 + .10).

It is interesting to note, in passing, that overall both the categories of Semantic Intentions and Encoding Processes/Forms had individual variables which showed very high nonresponse rates (SOV=.40; Experiential=.49). However, it might be argued that the SOV nonresponses are actually not nonresponses, being SVO productions, and might thus be categorized as type-B responses. In this case, the difference overall between the encoding process/forms category and the semantic intentions category becomes much greater: the encoding processes/forms category is 93% (.63 + .30), and the semantic intentions category is 73% (.63 + .10). Initial figures are similarly higher for the encoding processes/forms category at 97% (.71 + .26), and lower for the semantic intentions group (.74 + .09). A statistical comparison of the pooled A+B categories for each category in the two experimental groups (this figure representing the extent to which subjects remembered to mark a variable) reveals that neither category is significantly different from the other.

A secondary and more localized comparison of the different learning patterns for each variable group can be seen in the last column of Table 4.1 (Part A) and in the last four columns of Table 4.1 (Part B). The semantic intentions group contained the variables in which subjects made the highest scores (Animacy=.98 initially, .89 overall). However, the lowest initial score was an encoding process variable (SOV=.64), and overall, a semantic intention variable (Experiential=.46). Secondly, the variables in the semantic intentions group showed overall a 5% greater reduction in success across the four activity types, suggesting that new and unexpected concepts are more apt to be forgotten in conditions of reduced monitoring and increased focus on the message than are new and unexpected Encoding Processes/Forms. Thirdly, the two groups showed differing effects as a result of decay over time. The variables in the semantic intentions group were retained 10% better than those in the other group in two six-month posttests, but Encoding Processes/Forms recovered to a point 14% above that of the other group in a final written test administered one day after an oral test six months after the testing week.

In summary, although none of the differences between the two experimental groups was significant in either sampling period, important differences existed between the two groups in the extent to which subjects remembered overall to use variables in an experimental category, variation of variables within a group, effects of monitoring on activity type, and time effects. Although there is no statistical evidence to support the second hypothesis, these differences suggest that new and unexpected Semantic Intentions such as Experiential and Generational will require cultural reinforcement and the need to be used meaningfully in communicative situations if learning is to succeed.

As explained in the last section of the first chapter, the assumptions about these differences in learning patterns were based on the premise that new and unexpected Semantic Intentions would be learned quickly, whereas new and unexpected Encoding Processes/Forms, although comprehended, would require a greater amount of time to develop as an acquired reaction on the part of the L2 learner. In general, this assumption does not appear to be valid. As might have been expected, subjects remembered better to use new and unexpected Encoding Processes/Forms overall, and made more errors in using them since there were many more forms to be learned. They also supplied nonresponses overall less often than with new and unexpected Semantic Intentions, since semantic variables expressed concepts not expected or used in the L1. However, neither group showed the predicted differences during the teaching week, and in fact neither group was well retained after six months. Both variables recovered substantially when subjects were reimmersed into the use of the language, although the encoding group recovered 14% better. What emerged as a better predictor of differences in learning patterns in the experiment, and particularly of subject differences within variables and subgroups of variables were factors such as age, sex, the ability of a subject to apply a metalanguage label to a variable, and the "strangeness" of a new semantic intention or encoding process/form in terms of what a language can be expected to contain. These will be discussed in more detail in subsequent sections.

Hypothesis No. 3

Within each of the two task variable categories, novel semantic intentions and novel encoding processes, a hierarchy of difficulty may be established

In Table 4.2, the variables within each experimental group are ranked in the order of success initially and overall which subjects experienced in their learning. The ordering is established in two ways: firstly, through a weighted score (the global score) and secondly through a percentage distribution of A, B, and C responses. The order of difficulty of variables within each group, as shown in Table 4.2 is the following:

Semantic Intentions

1. Animacy was the best learned variable in this experimental category from every point of view. Subjects made the highest global score, provided the highest percentage of correct answers (A), made the fewest number of errors (B), and provided the lowest percentage

TABLE 4.2 HIERARCHY OF DIFFICULTY OF VARIABLES WITHIN THE TWO EXPERIMENTAL CATEGORIES

A. INITIAL SUBSET

SEMANTIC INTENTIONS

	GLOBAL SCORE	A	B	C
ANIMACY	.98	.97	.015	.015
GENERAT	.72	.64	.16	.20
EXPER	.67	.62	.09	.29

ENCODING PROCESSES/FORMS

PAST	.83	.80	.06	.14
PLURAL	.78	.60	.36	.04
SOV	.64	.64	0.0	.36

B. OVERALL RESULTS

SEMANTIC INTENTIONS

	GLOBAL SCORE	A	B	C
ANIMACY	.89	.86	.04	.10
GENERAT	.72	.64	.16	.20
EXPER	.46	.40	.11	.49

ENCODING PROCESSES/FORMS

PLURAL	.78	.61	.34	.05
PAST	.77	.71	.13	.16
SOV	.58	.56	.04	.40

of nonresponses in obligatory occasions in both sampling periods.

2. Generational was the second best learned variable in this group from all points of view, except that of type-B responses. Subjects made the greatest amount of error in the use of Generational of the three variables in this category in both sampling periods (which in the case of Generational, was the same period). This was the last variable introduced, which could account for the

substantial confusion which subjects experienced between the forms of Experiential and Generational.

3. Experiential was the least well learned variable in this category, as well as in the experiment. Subjects made the lowest global score, percentage of correct answers (A) and the highest level of nonresponses (C) of all variables in Experiential in both sampling periods. It was, however, used by subjects with a lower percentage of error than Generational, the variable in this category which showed the highest percentage of error.

These results confirm the order of of difficulty predicted in Section B of Chapter 2. However, see a further discussion of the ordering of Animacy below.

Encoding Processes/Forms

1. In the initial subset, Past was the best learned variable in terms of the global score and A responses. Plural was the best learned variable overall in this second experimental category in terms of the global score. Subjects responded 10% better in A responses in Past than in Plural. Plural showed the highest amount of error of all six variables (B responses) both initially and overall, but the lowest percentage of nonresponses in both sampling periods. The reasons for the high error rates are obvious. The forms of Plural were unpredictable, and there was a very large number of

forms to be learned and remembered. Although Plural and Past both exist as well defined and expected Semantic Intentions in English, Plural was ignored in obligatory contexts approximately 10% less often than Past. The reason for this can be found in an avoidance strategy used by subjects, who were aware that their abilities were not well developed in the formation of plural suffixes.

2. Initially, Plural was learned second best in the encoding process category. Overall, Past was only slighly less well learned than Plural in terms of its weighted score. Past was, however, the variable which showed the highest level of correct responses (A) initially and overall. In terms of B and C responses, subjects performed at a midpoint between the other two variables in this category in both sampling periods.
3. The least well learned variable in both sampling periods in the encoding process/forms category was SOV. It showed the lowest composite score and percentage of correct A responses, as well as the highest level of nonresponses. It showed the same type of low-level success in this category as did Experiential overall in the semantic intentions category.

The third hypothesis is confirmed. However, the order of difficulty for Encoding Forms shown in these results in either of the two samples is not the hierarcy predicted in Chapter 2. A hierarchy of difficulty has been established in each experimental category based on two parameters: the global score, and a three-tiered system of response percentages. As can be seen from the results, both categories in both samples have one variable which shows large percentages of C nonresponses. As well, the encoding process category contains one variable, Plural, in which large percentages of error perturbs the overall relatedness of global scores and A responses. A number of reasons explaining the hierarchy will be discussed in the next section.

B. Discussion of Results

As has been shown in the preceding section, different learning patterns existed in each of the two experimental categories in each sampling period, and a hierarchy of difficulty was established within each of the two groups. This section will suggest a number of reasons for these differing patterns and difficulties in the learning of the variables in each group.

Semantic Intentions

Subjects learned Animacy best initially and overall in this category, perhaps due to a primacy effect as explained above. It should be noted, however, that two factors which at first glance may be thought to have played a role in explaining the overall results reported earlier, contact time and occasions for its use, were not significant predictors of success. Time correlated with success at .40 and number of obligatory occasions correlated with success at .53 ($p<.20$). Contact time and number of obligatory occasions correlated together at a .90 level of significance.

A third factor, the possibility of serial position effects on learning, cannot be completely discounted. In the ranking of Semantic Intentions, Animacy, the first variable presented, was the best learned. Subjects did significantly better ($p<.001$ initially and $p<.01$ overall) in Animacy than in all other variables (see Tables 3.10 and 3.14). In this case, a primacy effect may explain the finding. However, no such primacy effect is observed in the encoding process category: Plural and SOV, which were presented simultaneously, show a significant difference ($p<.01$ initially and $p<.05$ overall) as shown in Tables 3.10 and 3.14.

A recency effect can not be completely discounted for within-group variation in each of the two experimental categories. Past, the last encoding process variable presented, is significantly better than SOV, the middle encoding process presentation ($p<.01$ initially and $p<.05$ overall), as shown in Tables 3.10 and 3.14. In addition, Generational, the last semantic intention variable, is significantly better than Experiential, which was the middle semantic intention variable ($p<.001$). Initially, however, there was no significant difference between these two variables. In the overall sample, recency effects can be completely excluded for variables belonging to both of the experimental groups, since Generational, the last of the six variables presented is not significantly different from Past, which was the fifth variable. Initially, however, Generational and Past were significantly different ($p<.05$, as shown in Tables 3.10 and 3.14).

Other reasons than this also suggest themselves as possible explanations of why subjects found Animacy easier to learn in both sampling periods than the other two in the category. While no determination can be made of the role of these reasons vis-à-vis that of the primacy effect, they are worth commenting upon. Subjects were able to form the [+animate] concept more easily than [-animate] in the concept formation experiment. It is interesting to note that [+animate] was learned as a concept more easily than [-animate], and it will be recalled from the results in Chapter 3 that subjects made fewer errors in marking [+animate] nouns than [-animate] nouns in the main experiment. Animacy as a concept was not dependent on cultural conventions as was the case with Generational, nor did it involve a constant assessment of referents and experience vis-à-vis the speaker's senses. The classification of all noun referents into a state of living and nonliving elements proved to be a task which the subjects found easy to perform in a language-embedded context. The greater ease of learnability of both the

Animate concept and the [+animate] realization of this concept suggests the importance which other living beings probably play in our life. Animate objects do influence us very profoundly, much more so than do nonliving entities. This situation seems to be reflected in the heightened cognitive awareness which subjects had of animate beings.

The learning of Generational placed it second in both sampling periods in the semantic intentions category, and was heavily dependent on an awareness of cultural conventions seen by some of the subjects as merely "manners". In the case of this variable, the convention was based on age distinctions between speaker and hearer. This "cultural" variable was harder to learn than notions of animacy, probably because it involved an assessment of age differences between speaker and addressee, which were redundantly repeated each time there was a command or a question. The two males in the experiment experienced the lowest level of success in learning Generational, whereas, in general, the females scored highly in this variable. As well, the older the age of the female subject the higher was her level of success in Generational. A personal relevancy factor seems to have been at work. This experiment suggest that males may be less sensitive to social conventions than females. This is supported by the findings from field dependence-independence studies which have found males to be more analytically inclined than females, who tend to enter professions such as teaching and social work, which stress personal contact and sensitivity to others (Witkin, Moore, Goodenough, & Cox, 1977). This variable seemed to be more difficult for the subjects to learn than Animacy because of its cultural base. As well, the learner's sex and age within sex group were strong predictors of success.

Experiential proved to be the hardest variable to learn in the semantic category over the entire sampling period. As shown in Table 3.14, the learning of Experiential was significantly different from every other variable except Generational. In the initial subset, Experiential was only slightly less well learned than Generational (.62 vs. .64). However, subjects scarcely remembered to use Experiential when they were involved in serious communication activities, such as charades and puppets, which too place towards the end of the teaching week. As well, the teaching environment did not provide the type of cultural reinforcement necessary to maintain the early success achieved in this variable.

As a concept, Experiential was different from the other two semantic intention variables, in that it was a situational concept: i.e., it expressed the status of a referent or an action relevant to the senses. Before conducting the experiment, the experimenter's impression was that this concept would not be difficult to learn to use, based in part on the ease with which the concept was learned in the concept-formation study. More than any other variable in the experiment, subjects found across the experiment that Experiential was simply irrelevant, and forgot to mark it.

In the production of sentences, subjects did not treat Experiential as an AUX, as had been intended. It was rather treated like an adverbial particle, and was considered as extra, perhaps more to the point, as superfluous information to be delivered either before or after the important things. This variable seemed to undergo the effects of a noninterruption process similar to Slobin's (1973) operation principle D, which states that children developing an L1 "avoid interrupting or rearranging linguistic units". Kawashima (1980) and Lynkowsky (1980), in two studies of childrens' processing of relative clauses in Japanese and Ukrainian, found that structures such as centre-embedded relatives which interrupt sentence processing were harder to comprehend than those which did not interrupt the stream of expected information. In the present study, subjects forgot to mark Experiential, since it seemed to contribute so little to their message, or alternatively, shifted it to the periphery of utterances.

Another possible reason as to why subjects had so much difficulty overall in learning this variable relates to the learners' perception of the experiential concept. Subjects may have considered that Experiential marked in a sentence was associated less with the verbal than with nouns, and in particular, the direct object. In learning this variable, some subjects had difficulty in understanding, in a sentence such as "The boy threw the ball", where a Morph speaker marks the verb "threw" as +experiential, that it is the action of throwing rather than the speaker's sensory perception of the thrown ball which was important. If a displacement of the experiential function onto nouns was occurring in the experiment, this may also explain why Experiential was shifted by subjects to the sentence periphery, particularly since nouns tended to be found more frequently in this position through a misuse of SOV, as previously discussed.

The author had at his disposal an extra-experimental means of confirming the difficulty of this variable. As a project on learning strategies in a graduate course in Applied Linguistics, students in the course were asked to learn an abbreviated form of Morph consisting of the six variables and a small lexicon. Without exception, all students during a two-year period reported having the most difficulty with Experiential, although they could not give reasons why this should be.

Encoding Processes/Forms

All three process/form variables used known semantic concepts and communicated them using unexpected processes. Plural was expected to be the least well learned as a result of its many suffixing forms, yet it was the best learned variable in this experimental group across the entire experiment. Subjects experienced greater difficulty during the initial subset in learning Plural than in learning Past; however, their performance improved with practice in Plural.

As mentioned, the most obvious reason for this long-term success, contact time spent in learning and occasions for using and learning the forms, did not play a large role in explaining overall success in Plural. In spite of significantly large amounts of error (type-B responses) in both sampling periods, subjects did achieve a high level of success in Plural. One possible reason for this may be the extreme familiarity of the grammatical concept "plural". Subjects had no difficulty in comprehending the notion, and most, realizing that the task would be long and difficult, began immediately committing a composite form of noun plus its plural suffix to memory. The clarity of what the task involved may well explain the reason why Plural was so well mastered overall. There were also some direct effects of practice as a strategy for mastering this variable. Those subjects who reported practising the plural forms were without exception those who fared best in its mastery (MA, MU, V, and ST).

Past, based on infixing and reduplication, was on the other hand dependent for its learning on the application of a compact morphophonemic rule: "Find the first vowel in a verb, immediately before it copy the vowel plus 'm'". The concepts "past" and "plural" were both familiar to subjects as a result of their L1 knowledge. In Morph, however, they were less struck by the size of learning Past than by the learning of Plural. They did not practise Past in the same way as they practised Plural, and their overall performance in Past showed it. Past was initially learned the best of the encoding process variables, and subjects gained a high level of success in its use. The experimenter learned after the testing week, however, that only two subjects (MU and MA) were able to state correctly the rule for formation of Past. The other subjects, even though they were able to produce correct Past forms, could not correctly verbalize how they were forming it. This inability to give a rule for a correctly used structure is typical of naive or young native speakers of an L1. The experimenter was most interested to discover that formal learning of L2 structures can in certain instances be accomplished through process typical of the way young children learn their L1, as well as through continuing cognitive awareness of a rule.

The experimenter was interested in determining whether Hindiba, a secret language described in Section D of Chapter 2, which was spoken by five of the subjects, would have any facilitating effect on the learning of Past. The average performance in Past of the five speakers who were conversant in Hindiba was .76, whereas the average score in Past of the four nonspeakers of Hindiba was .81. Hindiba appears not to have influenced the learning of Past, as had been anticipated.

In spite of early success on the part of all subjects in learning Past, the decay rate for the retention of Past was the most severe of all variables. It may be that Past suffered so drastically from time because success relied heavily on actual use rather than on support from a rule. After six months subjects remembered in most cases that something was repeated in some way in the verb. In most cases, they forgot that the infix was a forward rather than a backward reduplication. The experimenter hypothesizes that some minimal form of practice during the end of teaching and formal testing after six months would have dramatically improved the decay rate of this variable.

SOV, the least well learned of the encoding variables in both sampling periods, probably suffered a fate similar to that of Experiential for the same reasons. Subjects found it totally strange, redundant, and unexpected. If the learners had found themselves obliged to learn this variable embedded in a learning environment where native speakers provided blank expressions or negative disapproval each time SVO was produced, the learning may have been different. Subjects were aware that failure to produce SOV did not result in failed communication. Perhaps because of this, they may have considered SOV as a feature of Morph which was less critical than other features.

This variable showed clear age effects, and in the case of SOV, age of the learner correlated quite highly with overall success at .50 (see Table 4.3). The youngest subjects were never able to learn SOV properly. This was likely because SOV was the least easily assigned a label, and the least familiar to the subjects in metalanguage terms of the three process/form variables. It is of interest to note, however, that SOV was the only variable in which performance improved after six months of reduced usage. The rate of success in posttests after six months was actually higher than in tests during the learning week (see Figure 3.3). This fact suggests that time may play an important role in the learning of variables which are difficult to label, and learned slowly through practice across time.

It should be added that some of the concomitant universals of SOV word order such as postpositions and auxiliaries which follow the main verb were intentionally excluded from the MAL (see a discussion of this point in Section B, Chapter 2). This exclusion could have influenced the results for SOV. As well, it was stated in Chapter 2 that the six variables were to be tested in pairs comprising one of each type of Semantic Intention and Encoding Process at the three loci NP, VP, and S. This was done to improve the comparability of the three pairs of variables. However, the loci have not been compared in the experiment because of a lack of homogeneity of variables in the encoding process category. Two of the three variables in this category are new forms of a known encoding process (plural suffixing and fixed word order were familiar to the nine subjects). Only Past was a radically new and unexpected encoding process in the experiment. The exclusion of the previously mentioned universals of SOV word order and the inclusion of more uniform and comparable set of variables in the encoding process/form category are topics for future research.

Lastly, although it was the experimenter's intention to keep the MAL as "natural" as possible, a number of exceptions to SOV word order, such as VO word order in questions and commands, as well as nouns following adjectives, had sufficiently large usage in the experiment to warrant a reexamination of their effects in any future research involving this variable.

In summary, a number of underlying principles are suggested as prime explanations for the different patterns found in this experiment.

1. What can be labelled in metalanguage terms will be easier than what cannot be labelled (SOV was difficult to label, it was poorly learned);
2. What is expected will be easier than what is not expected (this was the case for the plural suffixes ending in vowels, where "English" plural suffixes were easier to learn than unfamiliar single vowel suffixes, and also for Experiential and SOV, which were unexpected as language structures);
3. Invariant concepts will be easier than situational concepts, either cultural or sensory (compare the ease of learning of Animacy, an invariant concept with the difficulty of learning Generational and Experiential);
4. The age and sex of the learner can play a role in both novel encoding processes/forms and novel semantic intentions (age effects were found for SOV, although

these effects were related to notions of metalanguage, and sex differences were noted for Generational);

5. Novel concepts which interrupt the stream of important lexical information may be shifted to sentence-initial or sentence-final position to decrease their disruptive effect on sentence processing (this occured in the case of both SOV, where OSV was a common variant, and for Experiential, where the markers were treated as pre- or postsentential adverbs).

C. Issues Emerging from the Experiment

The Use of MALs (Miniature Artificial Languages) as a Research Tool

In spite of a number of justified criticisms of the past use of the controlled miniature artificial languages commonly called MALs as a means of investigating the cognitive and linguistic processes in language development, this study has demonstrated that a MAL can be successfully used to investigate language. A controlled language was used in the experiment to investigate six variables in two experimental categories. The MAL used succeeded as a research tool where many others have failed for a number of reasons mentioned earlier in the second chapter. It is worth stating again the features which were incorporated into this MAL which made it different from others. This language contained:

1. a number of different semantic fields organized around areas familiar to the subjects;
2. a sufficient number of lexical items and natural language-like syntactic structures to allow use of the MAL as a communication tool;
3. an extended learning period of 14 hours;
4. the possibility of use of this language by experimenter and subjects as a communication tool.

In the experiment, the MAL was used in the classroom and outside of it as a secret code because it contained enough natural language features to permit its use as an actual language. It is felt by the researcher that this type of controlled language containing elements of natural language is what must be employed in any future psycholinguistic research aiming at serious L2 study.

Learning and Communication Strategies Found in the Experiment

Second language researchers and teachers have described various learning and communication strategies employed by L2 learners. Four strategies in particular have been well investigated, and interesting examples of all four were found in this experiment. These strategies are: transfer, interference, overgeneralization, and simplification.

1. Transfer is generally defined as the attempt to apply one's knowledge of an L1 to new L2 situations. When language transfer succeeds, and when prior L1 knowledge benefits the learning task, it is called positive transfer. When prior linguistic knowledge and expectations interfere with L2 learning, this is called negative transfer or interference. As mentioned earlier, Contrastive Analysis stressed the role of L1 transfer and interference on the L2 learning task to the exclusion of all other types of learning.

In this experiment three types of transfer were noted: phonological, lexical, and syntactic. Phonological transfer from English was expected by the experimenter, since subjects were told that lexical items in Morph were to be pronounced as in English. In general, subjects reduced unstressed vowels to schwa and imposed English intonation patterns and word order on Morph. However, completely unexpected transfer effects emerged from French phonology. In the oral production of certain phones such as voiceless stops and lateral [l], two subjects in particular, MU and CH, consistently articulated French sounds. This was surprising since none of the subjects could be termed bilingual. Other effects from French were noted in the form of open syllabification used for Morph lexical items. For example, both J and MU produced [bɛ vər] for *bever* at different times, and MU produced [fra sid] for *fracid*.

The Morph definite article *en* was pronounced with remarkable consistency as [œ̃], French *un*. Not all subjects showed a transfer effect from French phonology. Four subjects in particular (CH, J, MA, MU) showed a strong and sustained phonological colouring from French throughout all of the experiment. They were sometimes aware of the French intrusions, as witnessed by comments such as the following:

V: "I'm starting to speak French. I'm saying *un* [œ̃]!" (I,4)
CH: "C'est...whoops! *en po barm*" (OT1)
J: "*En les panen*...hold on...I'm thinking of French now!" (OT2)
J: After producing *elle* for *en* "I'm doing French again!" (OT4)
MA: "Est-ce *en* [œ̃] *frush*...Oh!!!" (II,1)

Lexical intrusions from French were also noted, but their effect was less pronounced than was the case for phonological carryover. Lexical confusions were mostly caused by words in Morph which resembled French vocabulary. The use of *un* for *en* has already been mentioned. As well, French *vous* for *vo*, the Morph pronoun subject 'you' occurred. Morph *ou* meaning 'and' was frequently used with its French meaning 'or'. In communication exercises, expressions such *dix minutes* and *la zena* were produced.

At the level of syntax, French had no discernable effect on Morph. Instead, subjects were guided by a desire to establish a one-for-one correspondance between morphosyntactic elements in Morph and in English. All subjects, and in particular the youngest ones, expressed concern on a number of occasions that Morph had no verbal morpheme *-ing* nor an auxiliary verb to express past progressives. CH, the youngest learner, expressed this in the following way:

CH: "Is there any way of expressing "ing" at the end of the verb?" (I,4)

CH: "What about words like "driving" and things like that? How do you add the "ing"?" (II,2)

This concern on the part of subjects with the presence of an English-like auxiliary system was such that the experimenter decided to introduce an uninflected form of *metsa*, 'to be' to accommodate the learners' need for English morphological equivalents. Although forms for the variable Experiential were to occupy the AUX position, it was felt that more than one AUX exists in English and this feature could be incorporated into Morph.

2. In L2 acquisition studies, overgeneralization is used to refer to the application of an L2 rule--independently of

L1--to situations in which it does not apply. This strategy is well known and has been frequently mentioned in EL1 studies by children who create forms such as "singed" and "bringed". Morph was constructed in such a way that subjects would have the possibility of using overgeneralization techniques in three variables: Plural, SOV, and Generational.

In using the five plural categories, two subjects, MU and R tried to subsume as many nouns as possible in the *-en* group. R quite systematically assigned any unknown noun to this category. By midweek, however, she had abandonned the *-en* group for unknown plural assignment in favour of *-a*, which then become the repository for unknowns. This type of strategy was not used by the other subjects, who in general did not use overgeneralization for Plural.

SOV presented two occasions for overgeneralizations. The only exception to SOV word order was declaratives which contained *metsa* used as the copula 'to be' plus predicate adverbs or adjectives, and which used SVO or English word order:

En	*ta*	*pug*	*sha*	*metsa*	*zul*
The	[+anim]	boy	[+exper]	is	happy

'The boy is happy.'

A second place where SOV word order was not used was in negative and positive commands, in which VO word order was used:

Sha *blate en* *po* *chine*
[+exper] close the [-anim] door
'Close the door!'

Both of these cases were of special interest to the experimenter, because they offered the possibility of determining the impact of transfer vs. overgeneralization effects on beginning learners of an L2. Taylor (1975), basing himself on translation tasks performed by learners of Spanish, claims that beginning learners rely heavily on transfer, whereas intermediate learners prefer overgeneralization as a strategy. In the experiment, the experimenter found substantial counterevidence to Taylor's claim, at least as concerns syntactic overgeneralization. Subjects frequently attempted to regularize verbs with copula into the SOV pattern. Overgeneralization was most strongly felt in commands where all subjects to varying degrees, and in spite of teacher corrections, persisted in using OV as the word order typical of commands. In both of these cases, overgeneralization of a Morph rule was used even though one would have expected them to rely on the more familiar English order. Generational also offered the possibility for learner overgeneralizations, in that only forms of direct address (commands and questions) were marked for this variable. Subjects frequently added *pat* and *teg* to declarative sentences, and in particular this was done in communication-type activities.

3. Simplification is also a term widely used in the literature of L2 acquisition. This strategy was extensively used by students as a memory technique for remembering the rules of Morph. Several subjects did not concern themselves with the precise form of SOV. Many verbalized the rule in the following way: "The verb is at the end of the sentence". The assignment of unknown plurals to the *-en* category used by two of the subjects could alternatively be considered as a simplification strategy. The rule used by many subjects to form Past was similarly simplified to the extent that it was usually incorrect.

A number of other interesting learning and communication stategies were noted throughout the experiment. These are listed briefly below:

1. *Translation*

When producing Morph in various types of activities, subjects frequently repeated after a Morph utterance its English translation equivalent to assure comprehension.

2. *Avoidance*

This strategy was often used by subjects to avoid Plural. A number of students preferred to use long enumerations of singular nouns such as "the boy, the girl, and the baby" rather than using *panen* 'children'.

3. *Reliance on knowledge of the world to supply answers*

This strategy was best exemplified in the following exchange in the second hour of the fourth day:

Experimenter: Tell me who this command is directed towards. *Sha bleb en po kert* ('[+exp] drink the [-anim] milk'). Valerie?

V: It's directed towards kids. You'd put *pat*.

Experimenter: Listen to it again (repeats command).

V: Drink your milk.

Experimenter: OK, "drink the milk". What tells you that it's directed towards a younger person?

V: Because mothers don't say "drink your milk" to grandparents. Sounds like something a mother would say to a kid.

4. *Gestures*

These were used extensively in skits and charades to support and assure communication.

5. *Cognitive Elaboration*

Subjects reported having made conscious associations between items in a group of plurals in order to make the group more meaningful. The two males in the experiment associated *brenu* and *lewas*, Morph plural forms for 'coats' and 'chairs' with types of guns (Bren gun, Lewis gun). A number of the female subjects reported using elaborate relationships between *pat* and the proper noun Pat to remember the correct form the Experiential. Some used a rhyming strategy such as "*forfexas* rhymes with Texas".

6. *Practice*

As previously mentioned, the most successful learners reported practising for as much as 30 minutes daily. Subjects used practice as a means of remembering plural suffix forms.

7. *Repetition*

This technique was used extensively by three subjects, CH, L, and V. These three female subjects frequently echoed instructor questions, probably as a way of increasing processing time. About one-half of the subjects often "tested" the plural form of a noun in production by repeating the noun aloud in combination with its five possible suffixes. These subjects appeared to be accessing their auditory memory to find the correct noun plurals.

8. *Monitoring*

Success in all of the six variables varied as a function of the time available for monitoring. In highly structured activities where focus was on form, subjects were able to produce responses containing high levels of accuracy. In skits, puppets, and charades, where focus was on communication of a message and time for thinking about form was greatly reduced, monitoring was more difficult. In this latter type of activity, success levels dropped dramatically.

9. *Hypothesis testing*

One subject, V, showed a remarkable pattern of hypothesis testing in her attempts to learn SOV. Her first "hypothesis", at least in terms of sentence creation, was that SOV consisted solely of an inversion of the preposition and its complement in an SVO sentence. She maintained English word order, but inverted the two parts of a prepositional phrase (i.e. The boy goes the store to). She then rejected this hypothesis in favour of another. This hypothesis was that a sentence in Morph used SOV word order, but the preposition was displaced to a position immediately after the verb (i.e. The boy the store goes to). She finally found the correct form after passing through these two previously described hypotheses. Each of the three stages was stable, in that all sentences containing a prepositional phrase were processed in accordance with the rule in effect at that particular moment during the teaching week.

10. *Sensory modalities - preference for writing*

A number of subjects showed a marked preference for the use of the written form as a way of remembering language materials. The younger subjects in particular (CH, L, MA, J) wrote down nearly everything possible during the teaching week. The older subjects in the experiment relied less on writing and more on their acoustic memory. The importance of writing and visual memory in L2 learning has been described by Papalia (1975) and Reinert (1976).

Predictors of Success in the Experiment

A number of factors usually considered in the literature to be major predictors of success in L2 learning were tested in this study. Correlations of these factors with overall success as measured by the global score achieved across the entire experiment are shown in Table 4.3. In the present study, only one factor correlated with success at the .95 level of significance: subtest no. 4 of the Pimsleur Language Aptitude Battery (.72). This part of PLAB tested subjects' ability to discern grammatical relationships such as subject and direct object in unknown foreign language materials. As well, two other factors correlated with success at the .90 level of significance: years of formal French (.60) and primary contact time, which

TABLE 4.3 CORRELATION OF A NUMBER OF LANGUAGE FACTORS WITH OVERALL SUCCESS IN THE EXPERIMENT

FACTORS	CORRELATION WITH SUCCESS
ST#4 PLAB (Language Analysis)	.72*
Years of formal French	.60
Age and Success in all variables	.57
ST#3 PLAB (Knowledge of English vocabulary	.56
No. obligatory occasions for use of a variable	.53
Current grade in French	.51
Age and Success in SOV	.50
Secondary contact time	.48
Integrative Motivation	.48
Age and Success in Exper.	.46
Hidden Figures CF-1	.45
Total contact time spent in the variables	.40
English grade	.28
Hidden Figures CF-2	.26
Current school grade average	.21
PLAB	.20
Embedded Figures Test	-.01
Anxiety	-.56
Primary contact time	-.60

NOTE: $*p<.05=.666$; $p<.10=.582$; $p<.20=.472$

was the time during which the subjects' attention was focussed specifically on the use of a given variable through α, β, and γ exercises (-.60). The amount of time spent in primary contact time was a function of the experimenter's opinion as a language teacher of how much work was required by subjects to learn a variable. The negative correlation shows that the lower subjects scored in a variable, the more variable-specific work they received in the experiment. Conversely, the easier subjects found a variable, the less contact time they received.

The experimenter had expected that the three traditional predictors of success claimed by Jakobovits (1970) to explain 86% of variation in success in formal foreign language contexts (motivation and attitude = 33%; aptitude = 33%; IQ = 20%) would have played a larger role in this experiment. However, the fact that all of the subjects were bright, enthusiastic, and that they worked hard during the experiment to please the experimenter probably perturbed a variation which might otherwise have existed. The methodology used to teach Morph had much in common with that of the traditional French classroom, where language analysis is developed by means of a metalanguage. MU, the oldest and most successful learner in the experiment had the greatest number of years of contact with formal French (5 years) and as a result of this, the longest exposure to metalanguage notions and language analysis. This subject scored the highest number of points of all subjects in subtest no. 4 of PLAB. Conversely, the youngest and least successful learner in the experiment, CH, had the second least exposure to formal study of an L2 (only two years of French), and of course, less opportunity for developing abilities in language analysis. CH scored the lowest number of points in subtest no. 4 of PLAB. This finding would seem to suggest that formal learning of a new language is facilitated by the development of metalanguage and language analysis techniques learned in earlier L2 study. As well, the length of prior L2 experience and the age of the learner could affect success in formal L2 study.

A secondary group of eight factors showed moderately high correlations at the .80 level of significance. These factors were age of the learner (.57), subtest no. 3 of PLAB (.56), anxiety of the learner in the L2 classroom (-.56) (in the case of this factor, a negative correlation is indicative of low anxiety), the number of obligatory occasions of the use of a variable (.53), current grade in French (.51), age of the learner and success in SOV (.50), secondary contact time, which was the opportunity for using a variable when attention was focussed on other variables (.48), and integrative motivation (.48). Certain of these factors have been shown to contribute to success in L2 learning in other studies (Gardner & Lambert, 1972; Naiman, Froehlich, Stern & Todesco, 1975).

As noted earlier, the relatively small role played in this study by contact time for each variable is quite surprising. Total contact time correlated at only .40 with the overall global score. Although each of the two experimental groups of variables received equal amounts of time, there existed large differences in the amount of time devoted to each variable within a group. One would have expected that success in a variable would be related closely to the amount of time as well as to the number of occasions for use of a variable (these two factors correlated together at .90). In each experimental group, the longest studied variable was best learned (Animacy and Plural), however, in both groups the variable receiving the least amount of classroom time was second best learned (Generational and Past). The second variable introduced in each group was the one learned least well (Experiential and SOV). This would suggest that time devoted to a variable and its use in absolute terms are not good predictors of success. Other factors such as previous contact with L2 learning and knowledge of metalanguage which increases the "labelability" of a concept and form clearly played a much greater role in the experiment.

Both age and sex of the learner played an important role in the learning of two variables. The two males in the experiment were the low achievers in learning Generational. Success in this variable probably depended on the formalization and ongoing awareness of age differences between the speaker and addressee in commands and questions. Females were able to use this convention correctly.

Age differences played a key role in the ability to learn Morph. The age of subjects correlated quite highly with success in the experiment. The youngest learners were the least able to succeed in the experiment, and in particular in variables such as SOV and Experiential, precisely because they did not possess the means of labelling what was happening to major constituents and to language elements.

Pedagogical Implications of the Experiment

The results of this experiment have a number of implications for the teaching of languages in formal contexts.

1. *Vocabulary learning*

The experimenter was struck by the effectiveness of posted vocabulary lists in the classroom. Availability of lexical items was a decisive factor in encouraging early communication in Morph. All subjects reported after the experiment that having words immediately available for sentence creation helped to develop an immediate "feel" for the language. The experimenter was aware that complexity and length of sentences produced was substantially greater than was the case in other beginning language classes, precisely because of the security which an available lexicon afforded to the students. These lists also greatly decreased learning time of vocabulary items, in that the students used more vocabulary in the first few days of the experiment than might otherwise have been the case without the lists. By midweek, few students were even bothering to look at the lists for most lexical items, since these had already been quickly learned in the first few days.

A further observation on vocabulary learning was that nearly all subjects reported using well developed systems of cognitive elaboration as a means of remembering items in groups. The experimenter found that although he told the subjects that the five groups of plurals contained items which were related by chance, many nevertheless developed complex unifying principles to render members of a plural group cohesive and amenable to recall. This is best shown by the comment of MU in the second hour of the second day:

"It seems that a lot of the words in this group (the *-en* plural group) are masculine: uncle, father, student...".

The student in beginning L2 language classes may be well served, judging by the experiences in this experiment, by the visual availability of lexical items in the L2. As well, suggestions made by the teacher as to different ways of making seemingly unrelated items in a grouping more cohesive would probably be helpful, since students will sooner or later attempt to do this themselves.

2. *Learning of Grammatical Rules*

Two variables, SOV and Past, offered some interesting insights into rule learning. Although the rules for the formation of these two variables were posted in the classroom, they were attended to less rigourously than were the vocabulary lists. The experimenter was frequently surprised by the fact that a number of subjects had effectively learned some "rule", since they produced correct utterances. Yet they did so by invoking rules for usage of the variables which were partial rules, or simply incorrect rules. For example, the rule which many subjects invoked to explain SOV was "the action word is always the last word". Similarly, the rules for Past infixing were often incorrectly cited in forms such as "You add 'om' after the first vowel sound".

This type of experience in the experiment proved that learning of rules involves a physical as well as a psychological component. Subjects seemed to rely heavily on past physical experience to produce new processes and forms in the L2. The implication of this finding is that certain rules may be remembered best as habits rather than as cognitive rules.

3. *The effects of L2 on L3*

This finding was totally unexpected. French phonology and lexical items had a surprisingly large impact on the learning of Morph phonology and vocabulary. The L2 literature has virtually nothing to say on this subject, yet it seems reasonable to assume that all previous language experiences should exert an influence on a new language endeavour. The effects of French, however, were limited only to phonology and the lexicon. It had no influence on the learning of syntax in Morph, the L3. In fact, subjects attempted a word-by-word matching of elements in English with those present (or more importantly, those not present) in Morph.

This finding highlights the effects which L2 phonologies and lexicons can have on the learning of L3, as well as the lack of effect which the L2 syntax will have on L3.

4. *Overgeneralization vs. Transfer; Similar vs. Different*

In opposition to Taylor (1975), the experimenter found many examples of early overgeneralization in the target language in the case of three variables: Plural, SOV, and Generational. Two of these three variables are encoding process/form variables, suggesting that although learners may prefer to match morphemes on a one-by-one basis with their L1, there is nonetheless a strong current of conformity with the syntactic rules learned in the new L2. As well, the experimenter found that in terms of memory for the different forms of Plural, subjects were able to remember certain plural forms such as *kapaa* and *karku* because they were different from most other plural forms, or that nouns ending in a vowel were remembered because, unlike other nouns, they dropped final "e" when adding a plural suffix.

5. *Age and Sex as Learning Factors*

The experiment found that younger learners experience serious problems in learning new encoding processes and forms such as SOV. This is probably as a result of the fact that they have not yet been able to develop metalinguistic notions which would help them to understand new syntactic patterns. The concept-formation study showed also that older learners are better formers of concepts than younger learners. Male learners were slower than females in acquiring new culturally oriented concepts, as was shown in the learning experiences of Generational. On the other hand, males were faster learners of language independent concepts such as [+animate].

6. *Semantic Intentions vs. Encoding Processes/Forms in the learning of an L2*

The experiment has demonstrated that new and unexpected semantic intentions and new and unexpected encoding processes/forms both contribute to the problems and success in the learning of an L2. It is an interesting observation that possible primacy effects in learning can only be discounted in this study for the Encoding Process category. The possible role of these effects on the learning of Semantic Intentions, as well as the role of recency effects in both experimental categories, becomes an interesting topic for further research because of its pedagogical implications. As shown by the variations in within-group success in each of the two experimental categories, it is obvious that comprehension and reinforcement of a new semantic intention is equally as important as comprehension and automatization of new and unexpected processes and forms in an L2. Traditional L2 classes have tended to emphasize the "form" aspect of L2 development, usually leaving encoding process and semantic intention considerations out of the methodological picture. Based on the results of this experiment, teachers would be well advised to stress both parts of the language code.

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APPENDIX A: CONCEPT FORMATION TASK INSTRUCTIONS

I am going to show you a series of pictures (present a series of actions). I want you to figure out which pictures are examples of something I am thinking of without my telling you what that thing is. Suppose I am thinking of things colored red, and I show you pictures of different colored objects. With the first few pictures, you will just have to guess whether the picture represents what I am thinking about. After each guess, I'll tell you if you are right or wrong. Before long, you will see what I have in mind, and when you do, answer "yes" if the picture is an example of that idea. Let's try this with a simple set. To get started, always answer "no" to the first picture...(after going through set of triangles)...now we will do this with a bigger set of pictures. (After subject is able to correctly answer all stimulus pictures) Can you tell me what I was thinking of?

APPENDIX B: PICTURES USED IN ANIMACY TASK

1. fruit
2. telephones
3. a ball
4. a clock
5. a classroom
6. a smiling woman
7. a pair of shoes
8. a lamp
9. an office
10. some books
11. a table
12. a chair
13. a cat
14. some growing trees
15. two fish
16. loaves of bread
17. a school
18. a tree in bloom
19. a foot
20. some bicycles
21. a set of keys
22. a barking dog
23. a car
24. a mountain scene

25. a pair of hands
26. a sitting dog
27. a man's head
28. a house
29. a milk bottle and glass
30. an owl
31. a woman's head
32. an ear
33. a hand
34. two birds
35. a growing plant
36. different animals
37. a lake at sunset
38. lake with boats
39. a baby
40. a walking chicken
41. flying birds
42. a duck and a chicken
43. a desolate landscape
44. a swimming fish
45. a group of people
46. a cat chasing a bird
47. a hand and finger
48. human eyes
49. two children
50. a girafe
51. some eggs

52. an orange tree with oranges

APPENDIX C: PICTURES USED IN GENERATIONAL TASK

1. young boy walking
2. sleeping baby
3. young children playing in a nursery
4. grandfather in a rocking chair
5. baby in a cradle
6. toddlers sleeping
7. another grandfather in a rocking chair
8. 5-year old eating cereal
9. grandmother in a rocking chair
10. sleeping toddler
11. Clint Eastwood
12. smiling 5-year old
13. two early teens
14. middle-aged man in an office
15. middle-aged couple
16. group of teens
17. smiling elderly man
18. three elderly golfers
19. three priests
20. two elderly golfers
21. smiling baby
22. two dancing six-year olds
23. young woman about 30 years old

APPENDIX D: MINIGRAMMAR

Given: S

PS Rules

1. $S \rightarrow NP + VP$

2. $$NP \rightarrow \left[\begin{array}{l} \left\{\begin{array}{l} \text{POSS ADJ} \\ \text{ART} \end{array}\right\} + (\text{NUM}) + (\text{ADJ})* + \text{N} + (\text{PL}) + (\text{PP})* \\ \text{PRON} \end{array}\right]$$

3. $$\text{ART} \rightarrow \left\{\begin{array}{l} \text{DEF} \\ \text{INDEF} \end{array}\right\}$$

4. $$\text{N} \rightarrow \left[\begin{array}{l} \text{N anim} \\ \text{N inan} \end{array}\right]$$

5. $$\text{PRON} \rightarrow \left[\begin{array}{l} \text{P anim} \\ \text{P inan} \end{array}\right]$$

6. $$\text{VP} \rightarrow \left[\begin{array}{l} \text{AUX exp} + \left[\begin{array}{l} \text{NP} + (\text{DAT} + \text{NP}) \\ \emptyset \end{array}\right] + (\text{PP})* + \left[\begin{array}{l} \text{V t} \\ \text{V i} \end{array}\right] + (\text{PAST}) \\ \text{COP} + (\text{PAST}) + \text{PRED} \end{array}\right]$$

$$+ \ (\text{Adv}) + \underbrace{(\text{PRT gen}) + (\text{Q}) + (\text{NEG})}_{\text{free word order}}$$

7. $$\text{PRED} \rightarrow \left[\begin{array}{l} \text{NP} \\ \text{ADJ} \\ \text{PP} \end{array}\right]$$

8. $\text{PP} \rightarrow \text{PREP} + \text{NP}$

Lexicon

NUM = den, boun, talp, frape, fracid

DET = en

INDEF = $\begin{bmatrix} \emptyset/ \ \text{X + PL} \\ \text{den/ elsewhere} \end{bmatrix}$

ADJ = poist, blee, kansa, stith, coif, lant, boka, zul, acate, fa, sheg, stot, beme, kithe, gos, henk, visel, paf, tosh, shimp, nin, ver

N anim = *Group 1* brock, pug, snirt, pan, galp, figee, bab, tect, thede, threap, onfang.
Group 2 langle, letch, frush, nak, ousel.
Group 3 lask, mell, glother, pite, dagit, nim.
Group 4 seel, sark, firk, kapa.
Group 5 ped, flam, clow, zena, faunt, frith, catso.

N inan = *Group 1* nifle, nifly, cass, dess, affy, mozi, ti, rame, shab.
Group 2 hern, ruth, stum, kittle, geck, bever, nesh, fax, gabi, het, rouk, kert, daff, orth, nad, wan, mo, stent, pribble, reft, roose.
Group 3 shard, forfex, lew, feak, sokan, sal, thring, sik.
Group 4 boist, snudge, bace, toze, ferd, fust, ban, abster, bawn, spack.
Group 5 caf, bren, barm, chine, bley, blonk, tori, kibe sicker, mert, kark, marcid.

6

P anim = yo, vo, lo, so, no, sho; yom, vom, lom, som, nom, shom.

P inam = ro, sho; rom, shom.

V t = gast, gib, secal, arain, alan, thonk, par, blate, nuddle, pash, pind, tozal, bleb, puna, nis, mok, doss, seron, shenk, purfle, furnage, feeze, flurch, nimal, shardal, ta, twire, furca, pullo, thedal, geen, sikal, gat, mulat, odam, kot, fadge, orthal.

V i = secal, frim, sneck, barat, abarat, fouch, fike, folt, hova, ke, seld, turb, mird, plash, slade, harv, aharv, sneap, caple.

COP = metsa

PREP = ko, bat, pum, ma, bo, mut, fen, nat, tab, adure.

Q = ag

NEG = sen

PRT gen = pat, teg

AUX exp = sha, nop

DAT = nat, pum

POSS

ADJ = ya, va, la, sa, ra, na, sha

T-Rules

T1 (opt.) IMPERATIVE FORM

When the first NP = *VO*, delete the first NP.

T2 ANIMACY MARKING

When a N anim or a P anim occurs, insert *ta* before that N or P.

When a N inam or a P inam occurs, insert *po* before that N or P.

T3 (opt.) ADVERB FRONT SHIFTING

When a verb is followed by Adv, place Adv in sentence-initial position.

Morphophonemic Rules

M1 PAST FORMATION

To form the PAST of a verb, make the following change:

$\#(C)(C)VX \rightarrow \#(C)(C)\alpha VmVX$

Rules M2 to M6 involve formation of PLURAL

M2 Group 1 noun + PL → Noun + [-ɛn]

M3 Group 2 noun + PL → Noun + $\begin{bmatrix} [\text{-əz}]/\ [\text{+sib}]\_\_ \\ [\text{-s}]/\ [\text{-voice}]\_\_ \\ [\text{-z}]/\ [\text{+voice}]\_\_ \end{bmatrix}$

M4 Group 3 noun + PL → Noun + [-as]

M5 Group 4 noun + PL → Noun + [-a]

M6 Group 5 noun + PL → Noun + [-u]

APPENDIX E: LEXICAL ITEMS OF MORPH

NOUNS

NOTE: The plural of each noun is indicated in parentheses after the singular form.

1. answer- hern (s)
2. aunt- brock (en)
3. baby- lask (as)
4. ball- boist (a)
5. bed- nifle (en)
6. bedroom- nifly (en)
7. bicycle- cass (en)
8. bird- mell (as)
9. body- ped (u)
10. book- shard (as)
11. boy- pug (en)
12. bread- ruth (s)
13. brother- glother (as)
14. bus- snudge (a)
15. cateteria- caf (u)
16. candy- stum (s)
17. car- forfex (as)
18. cat- snirt (en)
19. ceiling- bace (a)
20. chair- lew (as)
21. child- pan (en)

22. classroom- dess (en)
23. clock- feak (as)
24. clothes- affy(en)
25. coat- bren (u)
26. cousin- seel (a)
27. cup- barm (u)
28. daughter- sark (a)
29. desk- kittle (s)
30. dog- langle (s)
31. door- chine (u)
32. dress- toze (a)
33. drink- bley (u)
34. ear- firk (a)
35. eye- flam (u)
36. father- galp (en)
37. finger- clow (u)
38. fire- geck (s)
39. floor- blonk (u)
40. flower- pite (as)
41. friend- kapa (a)
42. food- bever (s)
43. fruit- sokan (as)
44. fun- nesh (s)
45. garage- fax (s)
46. garden- gabi (s)
47. girl- zena (u)
48. grass- letch (s)

49. hair- faunt(u)
50. hand- figee (en)
51. house- tori (u)
52. homework- het (s)
53. jeans- ferd(a)
54. lamp- fust (a)
55. letter- rouk (s)
56. light- kibe (u)
57. man- frush (s)
58. meal- mozi (en)
59. milk- kert (s)
60. money- daff (s)
61. mother- nak (s)
62. mouth- bab (en)
63. nose- dagit (as)
64. office- sicker (u)
65. pencil- orth (s)
66. people- gar
67. plant- nim (as)
68. present (gift)- ban (s)
69. question- abster (a)
70. rain- nad (s)
71. ring- sal (as)
72. road- bawn (a)
73. sandwich- mert (u)
74. school- ti (en)
75. shirt- wan (s)

76. shoe- kark (u)
77. sidewalk- mo (s)
78. sister- frith (u)
79. snow- stent (s)
80. son- tect (en)
81. stairs- marcid(u)
82. store- thring (as)
83. student- thede (en)
84. table- spack (a)
85. teacher- catso (u)
86. telephone- sik (as)
87. television, computer- rame (en)
88. toy- pribble (s)
89. tree- threap (en)
90. uncle- onfang (en)
91. water- reft (s)
92. window- shab (en)
93. woman- ousel (s)
94. wall- roose (s)

VERBS

1. ask- gast
2. bring- gib
3. burn- secal
4. buy- arain
5. call- alan

6. catch- thonk
7. chase- par
8. close- blate
9. climb- nuddle
10. come- frim
11. cook- pash
12. cut- pind
13. dress- tozal
14. drink- bleb
15. drive- puna
16. eat- nis
17. fight- mok
18. do- doss
19. fly- seron
20. give- shenk
21. go- sneck
22. go up- barat
23. go down- abarat
24. have- purfle
25. be (is, am, are)- metsa
26. hit- furnage
27. listen (to)- fouch
28. live- fike
29. look- folt
30. make- feeze
31. open- flurch
32. play- hova

33. plant- nimal
34. read- shardal
35. ride- ta
36. roll- twire
37. run- ke
38. say- furca
39. see- pullo
40. sleep- seld
41. put on- turb
42. speak- mird
43. study- thedal
44. take- geen
45. talk- plash
46. telephone- sikal
47. think- slade
48. turn on- harv
49. turn off- aharv
50. throw- gat
51. use- mulat
52. visit- odam
53. walk- sneap
54. want- kot
55. wear- fadge
56. work- caple
57. write- orthal

ADJECTIVES

1. bad- poist
2. big- blee
3. black- kansa
4. blue- stith
5. first- coif
6. good- lant
7. green- boka
8. happy- zul
9. last- acate
10. little- fa
11. new- sheg
12. old- stot
13. other- beme
14. red- kithe
15. sick- gos
16. silly- henk
17. small- visel
18. sitting, seated- paf
19. that- tosh
20. this- shimp
21. white- nin
22. young- ver

Possessive adjectives

23. my- ya
24. your- va
25. his- la

26. her- sa
27. its- ra
28. our- na
29. their- sha

Numerals

30. one- den
31. two- boun
32. three- talk
33. four- frape
34. five- fracid

ADVERBS

1. also- ab
2. a lot- dop
3. here- shug
4. much- rixle
5. no (NEG)- sen
6. poorly- caxon
7. slowly- ter
8. today- acore
9. there- ret
10. well- flabel
11. yesterday- fleam

QUESTION WORDS

1. who- das
2. which- dan
3. why- dap
4. where- dag
5. when- dat
6. what- dal
7. how- gotch

PREPOSITIONS

1. at- ko
2. down- bat
3. for- pum
4. from- ma
5. in- bo
6. on- mut
7. of- fen
8. to- nat
9. up- tab
10. with- adure

CONJUNCTIVES

1. and- ou
2. but- san
3. because- tis

PRONOUNS

Subject

1. I- yo
2. you- vo
3. he- lo
4. she- so
5. we- no
6. it- ro
7. they- sho

Object

8. me- yom
9. you- vom
10. him- lom
11. her- som
12. it- rom
13. us- nom
14. them- shom

MISCELLANEOUS

1. question word- ag
2. thanks- grat

APPENDIX F: SIX RULES FOR MORPH

These rules were posted on the wall of the classroom during teaching sessions, but were not available to subjects during testing.

1. *Ta* and *po* (living vs. non-living) are attached to all nouns and pronouns
2. Plurals- there are five classes: *-en, -as, -a, -u, -s.*
3. *Sha* and *nop* (experienced vs. non-experienced) are used to indicate whether what is described is, or has been very recently experienced with the senses by the speaker as in point (4) below. *Sha* means that the speaker is actually seeing, hearing, feeling, touching, tasting, or smelling the event involved. *Nop* means that the speaker thinks that something is or was taking place, but wasn't physically a part of the event.
4. Word order in sentences:

   Example: *En ta pug en po boist sha gat*

   ↑ ↑ ↑

   DOER THING DONE ACTION EXPERIENCED

   'The boy throws the ball'
5. Past tense- is formed by repeating the vowel sound of the first vowel, adding 'm', and placing the vowel and 'm' before the first vowel in the verb. For example:

   thonk (catch)- *thomonk*; *shenk* (give)- *shemenk*;

alan (call)- *amalan.*

6. *Pat* and *teg* are used to show that the person spoken to is younger or older than the speaker. Nothing is used if the speaker and person addressed are of the same approximate age. *Pat* is used to refer to younger persons; *teg* refers to older persons. Both are used only in commands and questions, and are always at the end of the sentence.

Example: *Sha gat en po boist pat!*

↑ ↑ ↑

VERB EXP EXPERIENCER AGE DESIGNATOR

'Throw the ball!'

APPENDIX G: TRANSCRIPTION OF A SAMPLE LESSON

TRANSCRIPTION OF DAY 3, HOUR 4 (42 MINUTES)

F: Shannon, what is the plural of this...'a book'?

SH: *sharden, shardas.*

F: (repeats *shardas* twice). There's more than one here, what is it, Lys? (indicating a group of people in a picture)

L: *orth...ta gar.*

F: OK. The plural of 'bus', Valerie?

V: *snudga.*

F: (repeats) This one, Maureen?

MA: *en ta feakas* [fikəs].

F: That will be *po feakas* [fikæs], This one, Stacey? (indicating some food in a picture)

ST: *bever.*

F: OK, but use the word 'lunch'.

ST: *en po agamy*...oh! *kibes.*

V: *kibu.*

F: Right. How about this one? Lys? (showing a picture of some women)

L: *en ta ousels.*

F: That's right. 'The feet', Rebecca?

R: *sokanen*

F: No.

SH: *sokanas*.

F: That's right, *sokanas*. Now 'shoes, Jennifer?

J: *karka*.

F: No, Maureen?

MA: *karku*.

F: That's it, *karku*. Two balls, Valerie?

V: *po boista*.

F: That's right (repeats above answer). 'The toys', Chary?

CH: *Pribble*.

F: *Pribbles* (repeats). If we had more than one dog, Shannon?

SH: *Langles*.

F: Right, *langles*. 'Trees', Murray?

MU: *Threapen*.

F: *Threapen*. 'The beds', Shannon?

SH: *Niflyen*.

F: That's 'bedrooms'.

SH: *Nifly*.

F: *Po niflen*. Now 'bedrooms', Maureen?

MA: *Niflyen*.

F: Right, *niflyen*. The plural of sandwich, Lys?

L: *En po mertes* [mərtəs].

F: No, Rebecca?

R: *merta*.

F: No...Maureen?

MA: *En po merten*.

F: No. Shannon?

SH: *En po mertu.*

F: (Repeats twice) 'The cats', Murray?

MU: *En ta snirten.*

F: (repeats) What about television sets, Stacey?

ST: *Rame...po ramen.*

F: Right. What about these babies? Jennifer?

J: *Laskas.*

F: OK. Let's consider them to be children, Lys?

L: *Ta panen.*

F: Two of these, Maureen? (showing a picture of two cups)

MA: *En po barmu.*

F: Right. 'Letters', Lys?

L: *Po roukes* [rukəs].

F: No.

R: *Rouken.*

F: No.

R: *Rouka.*

F: Shannon, what's left?

SH: *Rouks.*

F: It's *rouks* (repeats twice more). 'Chairs', Chary?

CH: *Lewas.*

F: That's *po lewas*. What's this one, Stacey?

ST: *Forfexen.*

F: What's the plural of *po forfex*?

V: *Po forfexas.*

F: (repeats)

[MU says in the background 'Texas', like 'Texas'.]

F: These are two brothers. What is it Chary?

CH: *Glotheren*

F: It's not *glotheren*.

MU: I know it...*en ta glotheras* [glɔðərəs]

F: It's *glotheras* [glɔðəræs] (repeats). A couple of these birds, Chary?

CH: *Mellas*.

F: OK, *ta mellas*. 'Jeans', Shannon?

SH: *Firda*.

F: (repeats using *po*) These are lamps...Jennifer?

J: *Fusta*.

F: That's right, *po fusta*. 'Dresses', Lys?

L: *Po tozen*.

F: No, it's not *tozen*. Shannon?

SH: *Toza*.

F: It's *toza, po toza*. 'Roads', Maureen?

MA: *Po bawnu*.

F: No...Valerie?

V: *Bawna*.

F: It's *po bawna* (repeats). A bunch of lights, Rebecca?

R: *Agamya*.

F: Right (repeats twice). How about 'ceilings', Rebecca?

R: *Baca*...or...

F: That's right (repeats twice). How about some bicycles?

J: *Casses*.

F: That's *cassen* (repeats twice). We have some windows here...Shannon?

SH: *Sharda.*

F: No, it has to be *shab.*

SH: *Shabes* [šæbəz].

F: No, not *shabes* (pronounced as above). Chary?

CH: *Shaba.*

F: Not *shaba*...Maureen?

MA: *Shabu.*

F: No, Rebecca?

R: *Shaben.*

F: It's *shaben.*

MA: That rhymes with 'cabin'.

F: 'Mouths', Lys?

L: *En ta...babs.*

F: It's *baben* (repeats). This, Maureen? (indicating a picture of some buses)

MA: *En po snudga.*

F: Right. What about 'students', Rebecca?

R: *En po theda* [θidə].

F: *Ta...*

R: *Thedes* [θidəs], *thedu, theden.*

F: *Theden.* Two cafeterias, Maureen?

MA: *Cafu.*

F: Right, *po cafu.* Two stores, Chary?

CH: *Thringa.*

F: Wouldn't be *thringa.* Valerie?

V: *Thrings*...no *thringas* [æs].

F: (repeats twice using *po*) 'Clothes', Stacey?

ST: *Affyen.*

F: Right (repeats). What about this, Maureen? (showing a pictures of two eyes)

MA: *Flams.*

F: *Ta flamu* (repeats). 'Body', Lys?

L: *En ta peds.*

F: No...Rebecca?

R: *Pedu.*

F: Right (repeats twice). What have we learned today about our language? Maureen?

MA: *Sha* means that you can hear it, see it, smell it, and *dop* means that you can't see it or anything.

F: Was it *dop*?

CH: *Nop*!

F: What does *nop* mean again?

MA: You can't prove that...you think you... You can't see it, or smell it, or taste it.

F: I'd like to try some skits. I'm going to give you five minutes and I'd like you to come up with something. Think of a situation...there will be two of you, and you'll be talking to one another. You'll say something to one another. The others, I'd like you to try to follow what's being said. Break into pairs, develop your skit as fast as you can, work out the bare outlines of what you're going to be saying, and then let's see what you can do with it.

MU: Can we read it, or do we have to memorize it?

F: You can read it, then hand it in to me after.

FIVE MINUTES LATER

F: OK, Valerie, Chary, and Jennifer. Can the rest of you listen?

MA: What's 'the'?

F: *En.*

SKIT NO. 1

CH: *Dal feak sha metsa ro ag?*

V: *Dal feak sha metsa ro ag?*

J: *Ro sha metsa sen.*

V: *Ro sha metsa sen.*

CH: *Dal feak sha metsa ro ag?*

V: *Dal feak sha metsa ro ag?*

J: *Ro sha metsa sen.*

V: *Ro sha metsa sen.*

CH: *Dal feak sha metsa ro ag?*

V: *Dal feak sha metsa ro ag?*

J: *Ro sha metsa sen.*

V: *Ro sha metsa sen.*

CH: *Dal feak sha metsa ro ag?*

V: *Dal feak sha metsa ro ag?*

J: *Ro sha feak.*

V: *Ro sha feak.*

CH: *Ah! Ko acate.*

V: *Ah! Ko acate.*

J: *Ah! Ko acate.*

APPLAUSE

F: What are they saying? Chary said *dal feak sha metsa ro ag*. What is she saying? *Feak* is a clock. Can you imagine what they're trying to say? *Dal* is 'what'.

R: What does the clock say?

F: What time is it. That's the only way we can say 'What time is it?'. Then Jennifer responded....

J: *Dal sha metsa sen...*

F: Didn't you say *ro sha metsa sen*?

J: Oh yah!

F: *Ro* is 'it', *sha metsa* is 'I know about it, I can feel it; *sen* is 'not'. Isn't there a missing word there?

V: *Feak.*

F: *Ro sha metsa po feak sen*, 'it's not time'.

R: I get it.

F: Then you said *Dal po feak sha metsa ro ag*. What was your last response, Jennifer?

J: *Ro sha feak.*

R: 'It's time'.

F: Right (repeats). You'd have to say *ro sha metsa po feak*. Then Chary, you said *ko acate*, 'at last'. That's really good. Who's next? Maureen?

MA: Do we have to memorize it?

F: No. You others listen.

SKIT NO. 2

R: *Hi.*

SH: *Sha metsa vo den ta pug ag?*

R: *No.*

SH: *Sha metsa vo den ta snirt ag?*

R: *No.*

SH: *Sha metsa vo den ta langle ag?*

R: *No.*

SH: *Sha metsa vo po zenau ag?*

R: *No, yo metsa ta zena.*

SH: *Oh!*

R: *Das vo kot nat sneck pum den sneap ag?*

SH: *Dat ag?*

R: *Acore.*

SH: *OK. Dal doss yo sha gib ag?*

R: *Den po boist.*

SH: *OK. Lant no sha teng thonk.*

R: *Ag.*

APPLAUSE

F: Could you read it through slowly again? Listen one more time.

SH: *Sha metsa vo den ta pug ag?*

R: *No.*

SH: *Sha metsa vo den ta snirt ag?*

R: *No.*

F: I'll stop you there. Can anyone understand?

MU: I heard 'cat'.

SH: I'm saying 'Are you a dog?', then 'Are you a cat?'.

F: Then after that?

SH: *Sha metsa vo en ta langle ag?*

R: *No.*

SH: *Sha metsa vo po zenau ag?*

R: *No.*

F: What's being asked there?

SH: 'Are you girls?'

F: OK. Then the next part?

R: *No. Ya metsa ta zena. Doss vo kot nat sneck pum den sneap ag?*

F: (translates word by word) Do you use *po* for 'a walk'?

R,SH:

No.

SH: Then I said *dat ag acore*.

F: What does that mean?

CH: 'When'.

F: Right, then *acore*, 'today'.

SH: *Dal doss yo sha gib ag?*

R: *Den po boist.*

F: What does that mean?

R: 'What should I bring?'. Then I say 'a ball'.

SH: *Lant, no sha tang hova thonk.* 'Good, now we can play catch'.

F: (repeats translation) Go ahead Murray and Stacey.

SKIT NO. 3

MU: *Ching, ching.*

ST: *Gotch ta metsa vo ta sir ag?*

MU: *Yo metsa flabel. Dal po thring metsa shimp ag.*

ST: *Shimp metsa den po computer thring.*

MU: *Ah! Ta yo kot ta va daff.*

ST: *Ta vo metsa goss.*

MU: *Das ro impone.*

ST: *Ta yo sneck impone en po computer shenk to yom en po daff sen.*

MU: *Bah! Lant arain.*

APPLAUSE

F: Can you go through that slowly?

ST: *Gotch metsa vo ta sir ag?*

F: (repeats slowly)

SH: 'How are you sir?'

F: OK

MU: I said *ta yo metsa flabel.*

F: (repeats)

CH: 'I'm very well'.

F: OK. Then you said...

MU: *Dal po thring metsa shimp ag* (repeats twice).

F: Can anyone understand that?

CH: *Shimp* is 'this'.

F: *Dal* is 'what'.

CH: 'What do you have in this store?'.

MU: Close. 'What store is this?'. Then Stacey says: *Shimp metsa den po computer thring*.

CH: 'This is a computer store'.

F: (repeats translation)

MU: Then I say: *Ah! Ta yo kot ta va daff*.

F: *Kot* is 'want', *daff* is 'money'.

CH: 'I want your money'.

F: Right (repeats translation).

MU: Then Stacey says: *Ta vo metsa goss*.

MA: 'I don't have any'.

F: 'I'm sick'.

MU: No. *Vo*!

F: Oh! You are sick!

MU: Then I say: *Doss ro impone*.

F: (repeats and translates) 'Do it quickly'.

SH: 'Do it quickly'.

MU: Then Stacey says: *Ta yo sneck impone*.

F: *Sneck* is 'go'. Can anyone figure that out?

MA: 'I will go quickly'.

F: OK.

MU: Then Stacey says again: *En po computer shenk ta yom en po daff sen*.

F: (translates)

MU: Then I said: *Bah! Lant arain.*

F: That would be 'too bad', right?

MU: No.

F: *Lant* is 'good', *arain* is...

CH: 'bye'

F: Ah! 'Good-bye'. OK.

MA: I don't get it!

F: He's using this for 'good-bye'. Maureen, Lys, are you ready?

SKIT NO. 4

MA:

Ta nak, ta nak, yo kot shimp (*ta nak* pronounced as one syllable)

L: *No, ta sark.*

MA: *Ta nak, ta nak, yo kot tosh.*

L: *No, no, ta sark.*

MA: *Ta nak, ta nak, yo kot shimp ou tosh.*

L: *No, ta sark.*

MA: *Ta nak, ta nak, yo kot shimp.*

L: *No, ta sark.* This is a new person.

MA: *Sneck vo metsa ya ta nak ag?*

L: *Oh, of course.*

MA: *OK. Arain yom po shimp ou po tosh.*

L: *No.*

MA: *Pug! am ta yo zul yo purfle en sheg ta nak.*

L: *Oh pug!*

MA: *Pug! Boun ta nak vo den acore metsa nat rixle.*

F: What did you understand from this?

ST: Maureen always wanted someone to buy her something.

MA: She's my mommy!

F: Will you go through it line at a time?

MA: *Nak, nak, yo kot shimp.*

F: (repeats and translates)

L: 'Mother, mother, I want this'.

F: OK. Then Mother says...

L: *No, ta sark.*

F: OK, that's 'no daughter'.

MA: Then I say *nak, nak, yo kot tosh.*

F: 'I want that now'.

MA: Then she said: *no ta sark.*

F: (repeats and translates)

MA: Then I said *ta nak, ta nak, yo kot shimp ou tosh.*

F: So you want this or that.

MA: This and that.

F: To which you respond Lys...

L: I said: *no ta sark.*

F: OK, then the new person.

MA: A different mommy.

F: OK.

MA: It wasn't my mommy, just a lady that walked up. I said:
Shenk vo metsa ya ta nak ag?

CH: 'Will you buy me this?'

F: *Sneck* is 'go'.

MA: It's supposed to be 'will'...'will you be my mommy?'

F: (has MA repeat sentence in morph)

MA: Then she said 'of course'. Then I said: *OK. Arain yom po shimp, po shimp ou po tosh*. I said: 'OK, buy me this, this and that'.

F: OK.

MA: Then I said: *Pug! Am ta yo zul yo purfle en shag ta nak* (*en* pronounced [ɔn]).

F: Can anyone understand that? (has MA repeat sentence again). What is *am*?

MA: You don't have anything for 'am', so its *am*.

V: It's *metsa*.

MA: 'Boy am I happy', *yo purfle en* [ɔ] *ta shag ta nak*. 'I have a new mommy'. Then she says *Oh pug!*. I said *arain yom po shimp ou po tosh* again.

F: Buy me this and that.

MA: She said *Oh pug!*. Then I said: *Pug! Boun ta nak bo den acore metsa nat rixle*.

F: 'Boy, two mothers in one day is too much'. That's good! That's as far as we go today. Before you go, find the sentence you did for me. Keep the one you didn't do, and we'll start out with that one tomorrow.

APPENDIX H: SUBJECT DATA FOR ANIMACY, SECOND HOUR, FIFTH DAY

(V2)

SUBJ	RESP	PUPPETS	CHARADES	SCORE
CH	A	7	5	0.58(P)
	B		1(*ta* for *po*)	0.79(C)
	C	5 (2 PRON, 3 DO)	1 (DO)	0.66($\bar{X}$)
J	A	7		1.00
	B			--
	C			1.00
L	A	1	5	0.33
	B			1.00
	C	3 (2 PRON, 1 DO)		0.66
MA	A	10	4	0.77
	B			1.00
	C	3 (N2 in POSS)		0.89
MU	A	8	3	1.00
	B		1 *ta* for *po*	0.88
	C			0.94

R	A	7		0.75
	B		1	0.50
	C	2 (1 PRON, 1 DO)		0.63
SH	A	11	8	0.92
	B			0.53
	C	1 (ADV PHRASE)	6 (3 PRON)	0.73
ST	A	4	2	1.00
	B			0.66
	C		1	0.83
V	A	2	4	0.29
	B			0.66
	C	5 (1 PRON)	2 (1 DO)	0.48

AVERAGES - PUPPETS 0.74 (SD .27)
CHARADES 0.75 (SD .184)
ALL ACTIVITIES 0.76 (SD .16)

NOTE1: FOR EACH SUBJECT THE FIRST FIGURE IN THE "SCORE" COLUMN IS THE WEIGHTED SCORE (GLOBAL SCORE) FOR PERFORMANCE IN "PUPPETS", THE SECOND FIGURE IS THE SCORE FOR "CHARADES". THE LAST FIGURE IS THE AVERAGE OF BOTH OF THESE ACTIVITIES.

PERCENTAGES FOR EACH RESPONSE CATEGORY FOR ANIMACY V2

EXERCISE & TYPE	RESP CAT			NO.	PERCENTAGE
(δ) PUPPETS & CHARADES	A			88	0.73
	B	(*ta* for *po*)		3	0.03
	C	PRON	9		
		DO	7		
		ADV PHR	1		
		N2-POSS	3		
		N1	9	29	0.24
	TOTAL			120	

APPENDIX I: DATA TABLES

The 24 tables in this section present the following information:

(a) the overall percentages of "A", "B", and "C" responses for each subject in each variable (Tables I.1 to I.3);

(b) the raw data on which the above percentages are based (Tables I.4 to I.6);

(c) the total number of obligatory occasions for the use of a variable (Table I.7);

(d) matrices showing subject effects (overall results) in the variables (Tables I.8 to I.11);

(e) raw data for "A", "B", and "C" responses for subjects in the initial subset for the six variables grouped by blocks of 20 (Tables I.12 to I.17);

(f) percentages for the tables shown in (e) above (Tables I.18 to I.23);

(g) the global scores for each variable in the initial subset presented in blocks of 20 (Table I.24).

TABLE I.1 CORRECT OVERALL "A" RESPONSES (PERCENTAGES) BY SUBJECT AND VARIABLE

	ANIM	PLUR	SOV	EXP	PAST	GEN	AVER
CH	.88	.62	.17	.27	.79	.64	.56
L	.83	.51	.59	.41	.61	.49	.57
MA	.89	.71	.59	.46	.67	.81	.69
J	.85	.56	.81	.37	.76	.61	.66
ST	.90	.62	.48	.27	.61	.30	.53
SH	.90	.65	.75	.44	.80	.83	.73
R	.78	.47	.47	.24	.73	.82	.59
V	.88	.67	.39	.52	.53	.82	.64
MU	.90	.65	.88	.58	.89	.45	.73
AVER	.86	.61	.56	.40	.71	.64	.63

TABLE I.2 ATTEMPTED INCORRECT OVERALL "B" RESPONSES (PERCENTAGES) BY SUBJECT AND VARIABLE

	ANIM	PLUR	SOV	EXP	PAST	GEN	AVER
CH	.02	.33	.09	.18	.15	.06	.14
L	.05	.43	.07	.03	.18	.31	.18
MA	.02	.27	0.0	.11	.14	0.0	.09
J	.06	.30	0.0	.15	.03	.16	.12
ST	.03	.34	.10	.38	.25	.45	.26
SH	.02	.30	.04	.12	.07	.03	.10
R	.08	.45	.02	.08	.07	0.0	.12
V	.02	.30	.08	0.0	.26	0.0	.11
MU	.03	.32	0.0	.03	.07	.36	.14
AVER	.04	.34	.04	.11	.13	.16	.14

TABLE I.3 UNATTEMPTED OVERALL "C" RESPONSES (PERCENTAGES) BY SUBJECT AND VARIABLE

	ANIM	PLUR	SOV	EXP	PAST	GEN	AVER
CH	.10	.05	.74	.55	.06	.30	.30
L	.12	.06	.34	.56	.21	.20	.25
MA	.09	.02	.41	.43	.19	.19	.22
J	.09	.14	.19	.48	.21	.23	.22
ST	.07	.04	.42	.35	.14	.25	.21
SH	.08	.05	.21	.44	.13	.14	.18
R	.14	.08	.51	.68	.20	.18	.30
V	.10	.03	.53	.48	.21	.18	.26
MU	.07	.03	.12	.39	.04	.19	.14
AVER	.10	.05	.40	.49	.16	.20	.23

TABLE I.4 CORRECT OVERALL "A" RESPONSES (RAW DATA) BY SUBJECT AND VARIABLE

	ANIM	PLUR	SDV	EXP	PAST	GEN	TOTAL
CH	305	97	12	29	38	21	502
L	290	72	35	49	30	17	493
MA	382	140	51	58	38	25	694
J	258	79	34	33	29	19	452
ST	290	87	25	26	27	10	465
SH	314	102	50	52	36	25	579
R	268	75	27	25	32	27	454
V	314	107	29	62	25	28	565
MU	316	105	61	61	41	15	599
SUM	2737	864	324	395	296	187	4803
AVER	304.1	96	36	43.9	32.9	20.8	

TABLE I.5 ATTEMPTED INCORRECT OVERALL "B" RESPONSES (RAW DATA) BY SUBJECT AND VARIABLE

	ANIM	PLUR	SOV	EXP	PAST	GEN	TOTAL
CH	5	51	6	19	7	2	90
L	17	60	4	4	9	11	105
MA	9	53	0	14	8	0	84
J	19	43	0	13	1	5	81
ST	9	48	5	36	11	15	124
SH	7	47	3	14	3	1	75
R	29	72	1	8	3	0	113
V	6	48	6	0	12	0	72
MU	10	52	0	3	3	12	80
SUM	111	474	25	111	57	46	824
AVER.	12.3	52.7	2.8	12.3	6.3	5.1	

TABLE I.6 UNATTEMPTED OVERALL "C" RESPONSES (RAW DATA) BY SUBJECT AND VARIABLE

	ANIM	PLUR	SOV	EXP	PAST	GEN	TOTAL
CH	36	8	51	60	3	10	168
L	44	9	20	67	10	7	157
MA	40	5	36	55	11	6	153
J	25	19	8	43	8	7	110
ST	22	5	22	34	6	8	97
SH	29	7	14	51	6	4	111
R	45	14	29	71	9	6	174
V	37	5	39	57	10	6	154
MU	24	4	8	41	2	6	85
SUM	302	76	227	479	65	60	1209
AVER	33.6	8.4	25.2	53.2	7.2	6.7	

TABLE I.7 TOTAL NUMBER OF OBLIGATORY OCCASIONS BY SUBJECT AND VARIABLE

	ANIM	PLUR	SOV	EXP	PAST	GEN	TOTAL
CH	346	156	69	108	48	33	760
L	351	141	59	120	49	35	755
MA	431	198	87	127	57	31	931
J	302	141	42	89	38	31	643
ST	321	140	52	96	44	33	686
SH	350	156	67	117	45	30	765
R	342	161	57	104	44	33	741
V	357	160	74	119	47	34	791
MU	350	161	69	105	46	33	764
SUM	3150	1414	576	985	418	293	6836

TABLE I.8 T TESTS (INDEPENDENT SAMPLES) BETWEEN SUBJECTS (OVERALL GLOBAL SCORES)

	CH	L	MA	J	ST	SH	R	V	MU
CH		-.31	-.86	-.70	-.22	-1.17	-.14	-.44	-1.33
L			-.83	-.59	.10	-1.32	.20	-.21	-1.55
MA				.23	.83	-.47	.87	.52	-.71
J					.62	-.71	.68	.31	-.94
ST						-1.25	.09	-.28	-1.46
SH							1.27	.93	-.24
R								-.35	-1.46
V									-1.14
MU									

10DF, $p < .05 = 2.228$

TABLE I.9 T TESTS (INDEPENDENT SAMPLES) BETWEEN SUBJECTS (OVERALL "A" RESPONSES)

	CH	L	MA	J	ST	SH	R	V	MU
CH		-.08	-.99	-.73	.20	-1.27	-.22	-.58	-1.22
L			-1.39	.94	.35	-1.77	-.18	-.71	-1.62
MA				-.31	1.40	-.43	.90	.50	-.40
J					1.07	-.70	.59	.19	-.65
ST						1.71	.45	-.89	1.61
SH							-1.22	.87	0.00
R								-.41	1.15
V									.81
MU									

10DF $p < .05 = 2.228$

TABLE I.10 T TESTS (INDEPENDENT SAMPLES) BETWEEN SUBJECTS (OVERALL "B" RESPONSES)

	CH	L	MA	J	ST	SH	R	V	MU
CH		-.50	.77	.31	-1.45	.63	.24	.42	0.00
L			1.13	-.76	-.85	1.02	.64	.82	.43
MA				.47	-2.08	-.16	-.37	-.28	-.62
J					-1.72	.33	0.00	.14	-.25
ST						-1.99	-1.45	1.72	-1.26
SH							.23	-.15	.51
R								.12	.21
V									.35
MU									

10DF, $p<.05=2.228$

TABLE I.11 T TESTS (INDEPENDENT SAMPLES) BETWEEN SUBJECTS (OVERALL "C" RESPONSES)

	CH	L	MA	J	ST	SH	R	V	MU
CH		.36	.59	.61	.67	.91	0.00	.28	1.22
L			.30	-.33	.41	.76	-.41	-.09	1.20
MA				0.00	.11	.46	-.68	-.37	.92
J					.12	.51	-.71	-.40	1.02
ST						-.35	.77	-.48	-.83
SH							1.06	-.79	-.50
R								.31	-1.42
V									-1.20
MU									

10DF, p<.05=2.228

TABLE I.12 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR ANIMACY PRESENTED IN BLOCKS OF 20 (RAW DATA)

BLOCK	A	B	C
1	19	1	--
2	20	--	--
3	20	--	--
4	19	1	--
5	17	--	3
6	19	--	1
7	20	--	--
8	20	--	--
9	19	1	--
10	19	1	--
11	20	--	--
12	20	--	--
13	20	--	--
14	20	--	--
15	20	--	--
TOTAL	292	4	4
PERCENTAGE	.97	.015	.015

TABLE I.13 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR PLURAL PRESENTED IN BLOCKS OF 20

(RAW DATA)

BLOCK	A	B	C
1	14	4	2
2	15	5	--
3	14	5	1
4	10	9	1
5	14	6	--
6	7	12	1
7	11	9	--
8	16	4	--
9	15	5	--
10	13	7	--
11	10	10	--
12	11	9	--
13	10	10	--
14	7	7	6
15	12	6	2
TOTAL	179	108	13
PERCENTAGE	.60	.36	.04

TABLE I.14 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR SOV PRESENTED IN BLOCKS OF 20 (RAW DATA)

BLOCK	A	B	C
1	12	--	8
2	10	--	10
3	11	1	8
4	10	--	10
5	12	--	8
6	14	--	6
7	15	--	5
8	9	--	11
9	7	--	13
10	15	--	5
11	12	--	8
12	11	--	9
13	18	1	1
14	16	--	4
15	19	--	1
TOTAL	191	2	107
PERCENTAGE	.64	--	.36

TABLE I.15 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR EXPERIENTIAL PRESENTED IN BLOCKS OF 20 (RAW DATA)

BLOCK	A	B	C
1	18	2	--
2	14	4	2
3	12	4	4
4	4	1	15
5	15	4	1
6	9	4	7
7	7	3	10
8	14	1	5
9	19	--	1
10	15	--	5
11	4	--	16
12	11	--	9
13	15	4	1
14	18	--	2
15	12	1	7
TOTAL	187	28	85
PERCENTAGE	.62	.09	.29

TABLE I.16 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR PAST PRESENTED IN BLOCKS OF 20

(RAW DATA)

BLOCK	A	B	C
1	18	2	--
2	18	2	--
3	18	1	1
4	15	4	1
5	13	--	7
6	15	2	3
7	19	1	--
8	15	--	5
9	17	--	3
10	12	--	8
11	15	1	4
12	15	2	3
13	17	--	3
14	16	2	2
15	17	2	1
TOTAL	240	19	41
PERCENTAGE	.80	.06	.14

TABLE I.17 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR GENERATIONAL PRESENTED IN BLOCKS OF 20 (RAW DATA)

BLOCK	A	B	C
1	15	4	1
2	18	1	1
3	13	4	3
4	15	2	3
5	10	1	9
6	11	4	5
7	12	--	8
8	17	2	1
9	11	5	4
10	12	4	4
11	5	5	10
12	18	--	2
13	14	3	3
14	12	6	2
15	4	5	4
TOTAL	187	46	60
PERCENTAGE	.64	.16	.20

TABLE I.18 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR ANIMACY PRESENTED IN BLOCKS OF 20 (PERCENTAGES)

BLOCK	A	B	C
1	0.95	0.05	0.00
2	1.00	0.00	0.00
3	1.00	0.00	0.00
4	0.95	0.05	0.00
5	0.85	0.00	0.15
6	0.95	0.00	0.05
7	1.00	0.00	0.00
8	1.00	0.00	0.00
9	0.95	0.05	0.00
10	0.95	0.05	0.00
11	1.00	0.00	0.00
12	1.00	0.00	0.00
13	1.00	0.00	0.00
14	1.00	0.00	0.00
15	1.00	0.00	0.00
AVERAGE	0.97	0.015	0.015

TABLE I.19 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR PLURAL PRESENTED IN BLOCKS OF 20

(PERCENTAGES)

BLOCK	A	B	C
1	0.70	0.20	0.10
2	0.75	0.25	0.00
3	0.70	0.25	0.05
4	0.50	0.45	0.05
5	0.70	0.30	0.00
6	0.35	0.60	0.05
7	0.55	0.45	0.00
8	0.80	0.20	0.00
9	0.75	0.25	0.00
10	0.65	0.35	0.00
11	0.50	0.50	0.00
12	0.55	0.45	0.00
13	0.50	0.50	0.00
14	0.35	0.35	0.30
15	0.60	0.30	0.10
AVERAGE	0.60	0.36	0.04

TABLE I.20 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR SOV PRESENTED IN BLOCKS OF 20

(PERCENTAGES)

BLOCK	A	B	C
1	0.60	0.00	0.40
2	0.50	0.00	0.50
3	0.55	0.05	0.40
4	0.50	0.00	0.50
5	0.60	0.00	0.40
6	0.70	0.00	0.30
7	0.75	0.00	0.25
8	0.45	0.00	0.55
9	0.35	0.00	0.65
10	0.75	0.00	0.25
11	0.60	0.00	0.40
12	0.55	0.00	0.45
13	0.90	0.05	0.05
14	0.80	0.00	0.20
15	0.95	0.00	0.05
AVERAGE	0.64	0.00	0.36

TABLE I.21 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR EXPERIENTIAL PRESENTED IN BLOCKS OF 20 (PERCENTAGES)

BLOCK	A	B	C
1	0.90	0.10	0.00
2	0.70	0.20	0.10
3	0.60	0.20	0.20
4	0.20	0.05	0.75
5	0.75	0.20	0.05
6	0.45	0.20	0.35
7	0.35	0.15	0.50
8	0.70	0.05	0.25
9	0.95	0.00	0.05
10	0.75	0.00	0.25
11	0.20	0.00	0.80
12	0.55	0.00	0.45
13	0.75	0.20	0.05
14	0.90	0.00	0.10
15	0.60	0.05	0.35
AVERAGE	0.62	0.09	0.29

TABLE I.22 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR PAST PRESENTED IN BLOCKS OF 20 (PERCENTAGES)

BLOCK	A	B	C
1	0.90	0.10	0.00
2	0.90	0.10	0.00
3	0.90	0.05	0.05
4	0.75	0.20	0.05
5	0.65	0.00	0.35
6	0.75	0.10	0.15
7	0.95	0.05	0.00
8	0.75	0.00	0.25
9	0.85	0.00	0.15
10	0.60	0.00	0.40
11	0.75	0.05	0.20
12	0.75	0.10	0.15
13	0.85	0.00	0.15
14	0.80	0.10	0.10
15	0.85	0.10	0.05
AVERAGE	0.80	0.06	0.14

TABLE I.23 SUBJECT PERFORMANCE ("A", "B", AND "C" RESPONSES) IN THE INITIAL SUBSET FOR GENERATIONAL PRESENTED IN BLOCKS OF 20 (PERCENTAGES)

BLOCK	A	B	C
1	0.75	0.20	0.05
2	0.90	0.05	0.05
3	0.65	0.20	0.15
4	0.75	0.10	0.15
5	0.50	0.05	0.45
6	0.55	0.20	0.25
7	0.60	0.00	0.40
8	0.85	0.10	0.05
9	0.55	0.25	0.20
10	0.60	0.20	0.20
11	0.25	0.25	0.50
12	0.90	0.00	0.10
13	0.70	0.15	0.15
14	0.60	0.30	0.10
15	0.31	0.38	0.31
AVERAGE	0.64	0.16	0.20

TABLE I.24 SUBJECT PERFORMANCE (GLOBAL SCORE) IN EACH OF THE SIX VARIABLES IN THE INITIAL SUBSET PRESENTED IN BLOCKS OF 20

BLOCK	ANIM	PLUR	SOV	EXP	PAST	GEN
1	0.98	0.80	0.60	0.95	0.95	0.85
2	1.00	0.86	0.50	0.80	0.95	0.93
3	1.00	0.86	0.58	0.70	0.93	0.75
4	0.98	0.73	0.50	0.23	0.85	0.80
5	0.85	0.85	0.60	0.85	0.65	0.53
6	0.95	0.65	0.70	0.55	0.80	0.65
7	1.00	0.78	0.75	0.43	0.98	0.60
8	1.00	0.90	0.45	0.73	0.75	0.90
9	0.98	0.86	0.35	0.95	0.85	0.68
10	0.98	0.83	0.75	0.75	0.60	0.70
11	1.00	0.75	0.60	0.20	0.78	0.38
12	1.00	0.78	0.55	0.55	0.80	0.90
13	1.00	0.75	0.93	0.85	0.85	0.78
14	1.00	0.53	0.80	0.90	0.85	0.75
15	1.00	0.75	0.95	0.63	0.85	0.50
AVER	0.98	0.78	0.64	0.67	0.83	0.71